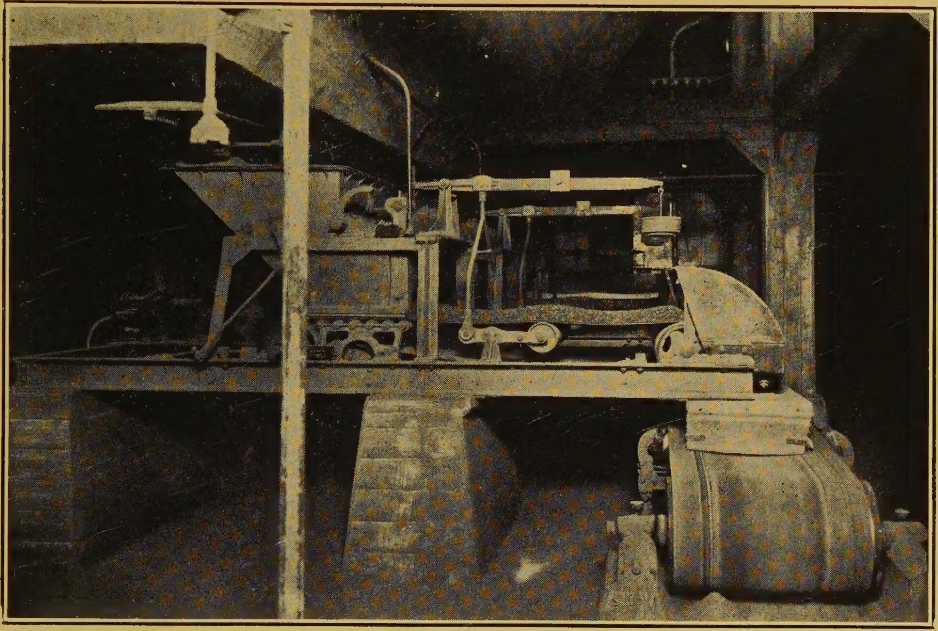
# MILL SECTION of Concrete

PROPORTION YOUR MATERIALS WITH THE AUTOMATIC FEEDER—WEIGHER—CONVEYOR



*Three Poidometers Proportioning Clinker and Gypsum in One of the Leading Western Cement Plants*

The above photo shows only one of many similar installations of Poidometers proportioning various kinds of materials in the cement industry.

The Poidometers shown above are arranged in battery, so that, if the supply of material in any of them falls below a certain level, the entire battery of machines will automatically stop.

When the missing material is again supplied they will automatically resume operation, thus assuring you of an accurate mixture of material at all times.

Space does not permit a thorough explanation of the many cost saving qualities of Schaffer Poidometers.

*Engineering Advice and Catalog on Request*

**SCHAFFER POIDOMETER COMPANY**

2818 Smallman Street
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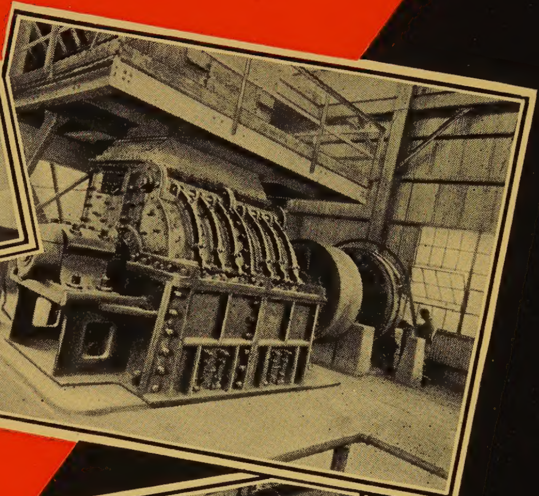
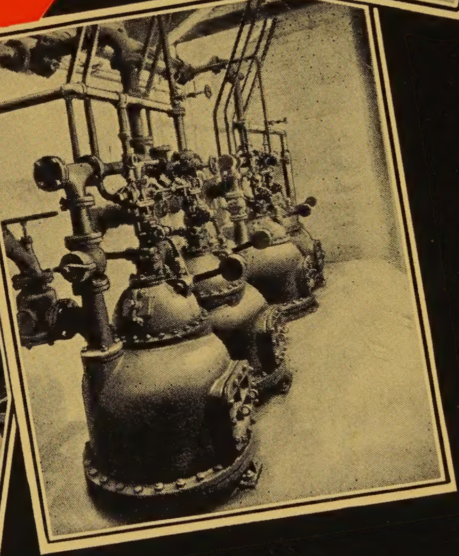
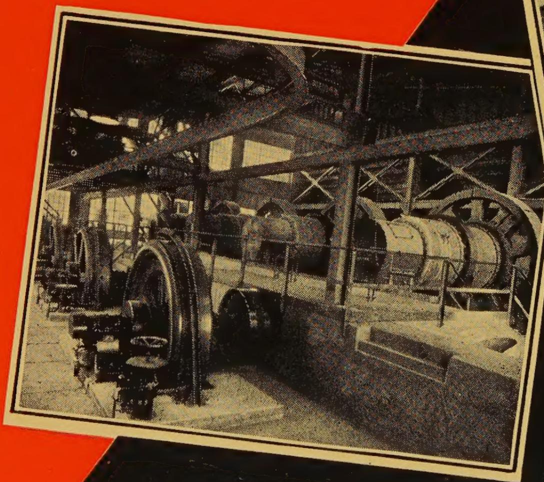
# POLYSIUS



***INSTALLATIONS IN PLANT OF KEYSTONE PORTLAND CEMENT CO., BATH, PENNA.***





## POLYSIUS CORPORATION

*BETHLEHEM TRUST BLDG.*
**BETHLEHEM PA.**

# MILL SECTION of Concrete

*The Cement Mill Edition of Concrete is edited exclusively for those interested in the manufacture of cement. Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.*

*The Cement Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition. The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.*

Volume 33 December, 1928 Number 6

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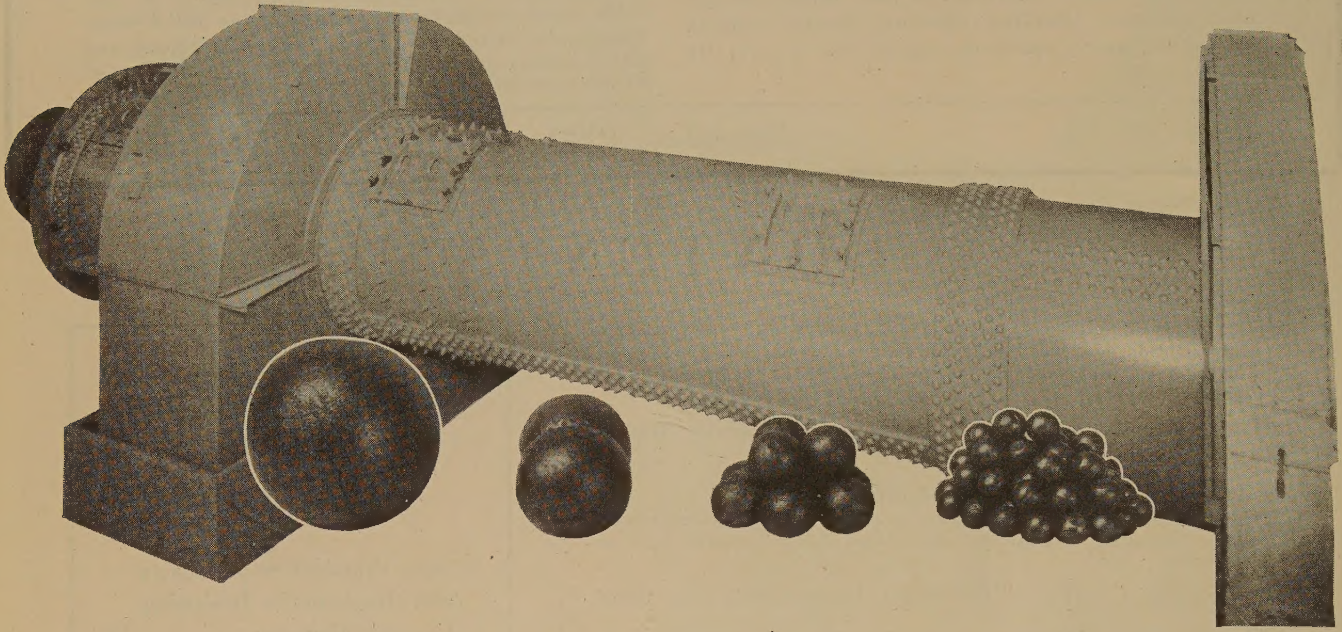

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MILL SECTION of

Concrete

Vol. 33 Chicago, December, 1928 No. 6

# Unusual Foundation Design at New Seattle Plant

## Some Notes on the Unique Foundations Developed to Support Kilns and Grinding Machines at the New Plant of the Pacific Coast Cement Company

By S. E. HUTTON
Chief Engineer, Pacific Coast Cement Co.

BECAUSE of the nature of the soil upon which the new plant of the Pacific Coast Cement Co. is being built some unusual and interesting foundation designs for heavy mechanical equipment have been adopted. These designs are the result of adapting the conditions as they were found to the particular requirements of the equipment installed, particularly the kilns, coolers and grinding units.

A preliminary description of the source of the raw materials, location and layout of the plant was published in the April, 1928, issue of the Mill Section of CONCRETE. While the raw materials will be secured at points some distance from the plant and shipped to the mill by boat, the plant itself will be located on tidewater in Seattle. It will be accessible by boat, railway and highway.

The tidewater location is responsible for the soil conditions that resulted in the designs mentioned. The foundations under the larger buildings and machines are built on piles carried by skin friction in sand of unknown depth. In working out machine foundations that would distribute their loads evenly over the piles under them, the types of foundation here described were developed.

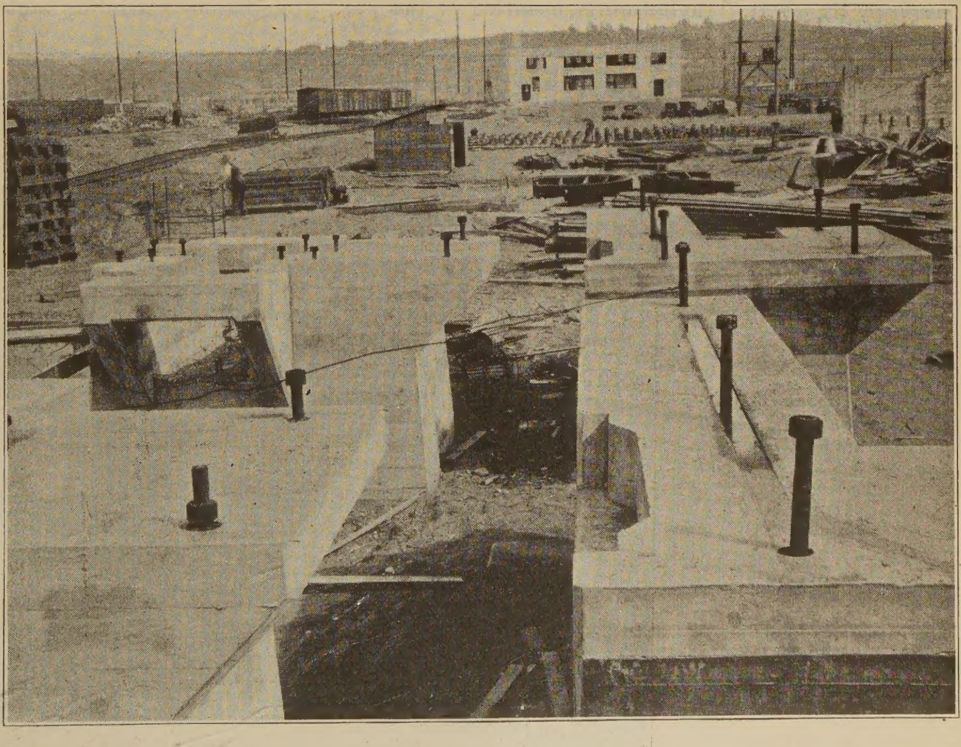


*Fig. 1.—Separated mill foundations. At the left are the foundations for the motors. At the right are the foundations for the driven end of the mills*

## Mill Foundations

It is not uncommon to combine, in one concrete mass, the foundations for the driven end of a compartment mill, the pinion shaft bearings, the pinion shaft extension bearings and the driving motor, but such a design is not well suited to a location requiring piles which do not "fetch up" on some hard stratum. The following procedure was therefore adopted.

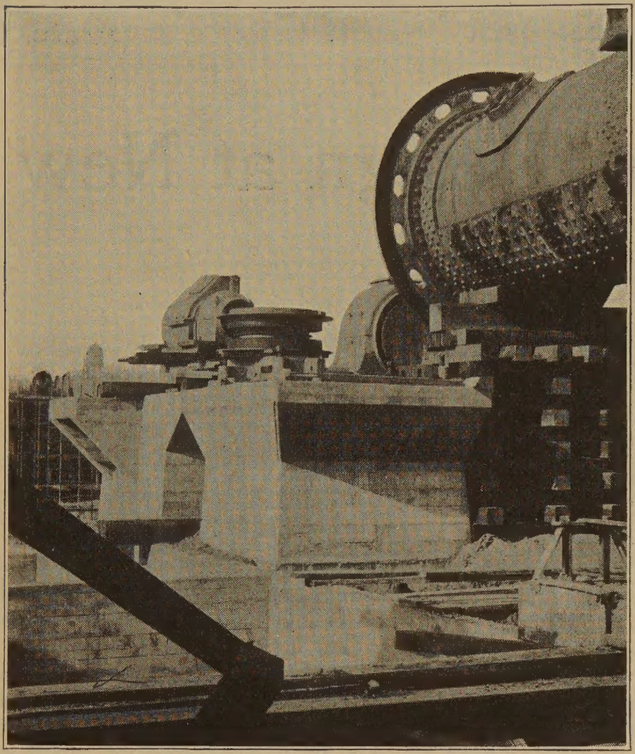


*Fig. 2.—Another view of the mill foundations*

The 7 ft. by 45 ft. Traylor mills installed at the Pacific Coast plant will be driven by 750 h.p. General Electric super-synchronous motors. The load per sq. ft. of foundation under the mill bearings is large, while that under the motors is relatively small. Following the Traylor Engineering and Manufacturing Company's common practice, a flexible coupling is located between the pinion shaft and the pinion shaft extension—not between the motor and the pinion shaft extension. This provides a convenient place at which to separate the mill and motor foundations. Accordingly, the super-synchronous motor, a rigid coupling, the pinion shaft extension with its one bearing, and one disk of the flexible coupling are carried on one foundation. The bearing under the driven end of the mill and the pinion shaft with its bearing are carried on another foundation.

Figure 1 illustrates this type of design. Parts of the foundations for two motors are shown at the left and the foundations for the driven end of the two Traylor mills are shown at the right.

## Foundation Design

In designing the foundations, rough estimates of the weight of the foundations were made and the number and arrangement of the piles under each foundation were determined. Then a division of the available ground was made to allot areas to the motor and the mill foundations, the latter requiring much the greater area. A corner of the footing under the mill bearing foundation can be seen extending toward the motor foundation in the illustration (Figure 1).

Next the location of the center of gravity of the load on each foundation and the shifting of pressure due to torque were determined; tentative designs of foundations and of footings required to cover the necessary piles were made, and finally satisfactory combinations were found, resulting in the odd looking foundations shown.

Space for conveyors to carry slurry and cement away from the mills is provided between the motor and mill foundations, the support of the pinion shaft bearings overhanging the conveyors and the footing of the mill bearing foundations extending under them.

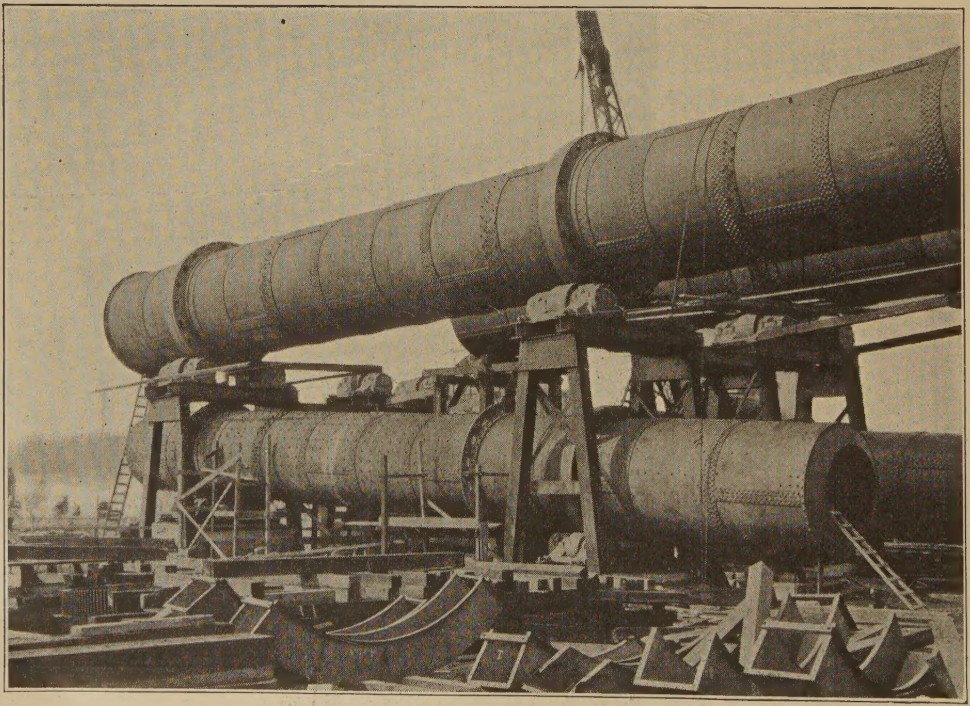


*Fig. 3.—Showing the design adopted for the kiln piers. A single foundation slab carries the kiln and cooler supports*

In order to have the smallest possible number of foundations, it was decided to combine the cooler foundations with the foundations from kiln piers No. 1 and No. 2.

When the kiln supports were first designed in 1926, reinforced concrete piers were provided for and in order to keep the kiln pier heights as low as possible, steel girders instead of a concrete slab or arch, were determined upon for pier No. 1. This design left much to be desired in the way of accessibility and ventilation, particularly with a metal-lined cooler.

The design was therefore changed to the type illustrated in Figure 3. The steel piers shown seem to meet every requirement. The riding rings and supports for the cooler are as well ventilated and practically as accessible as they would be with independent foundations. A single slab, on a group of piles, carries the kiln and cooler supports without uneven loading and the design as adopted meets every requirement without the additional cost of the piling required for separate foundations.

# Portland Cement Association Holds Its Twenty-Sixth Annual Meeting

## *Summary of the Meeting*

**Time: November 19, 20, 21, 1928** **Place: Blackstone Hotel, Chicago**

**Monday, November 19**

COMMITTEE MEETINGS.

**Tuesday, November 20**

GENERAL SESSION.

Reports of Committee on Accident Prevention and Insurance

Reports of Committee on Conservation

Symposium "Filters"

*H. Vanderwerp, Manitowoc Portland Cement Co., Manitowoc, Wis.*
*W. L. White, Jr., Sandusky Cement Co., Cleveland, Ohio.*

The Influence of Fineness of Raw Materials on the Burning of Portland Cement

*Dr. R. H. Bogue, Portland Cement Association Fellowship at U. S. Bureau of Standards, Washington, D. C.*

Ball and Tube Mill Grinding

*Harry W. Newton, Conservation Engineer, Portland Cement Association, Chicago.*

**Wednesday, November 21**

BUSINESS SESSION.

Memorial services were read for the following:

- D. N. ARMSTRONG, *late vice-president and general manager of the Missouri Portland Cement Co.*
- C. H. McNIDER, *late president of North Western States Portland Cement Co.*
- JOHN W. BOARDMAN, *late vice-president of the Huron and Wyandotte Portland Cement companies.*
- FRED J. SCHARER, *late sales director in Kansas City for the Consolidated Cement Corp.*

***The new officers elected were as follows:***

President, FRANK H. SMITH (*Lawrence*)
First Vice-President, CHARLES F. CONN (*Giant*)
Second Vice-President, J. B. JOHN (*Sandusky*)
Treasurer, JOHN L. SENIOR (*Consolidated*)

**DIRECTORS (3 Years)**

F. H. Powell (*Southwestern*)
G. S. Brown (*Alpha*)
A. C. Tagge (*Canada*)
C. K. Boettcher (*Colorado*)
E. M. Young (*Lehigh*)

**DIRECTORS (1 Year)**

B. F. Affleck (Blaine S. Smith Vacancy) (*Universal*)
M. J. Warner (C. F. Conn Vacancy) (*Nazareth*)
Blaine S. Smith (John A. Miller Vacancy) (*Penn-Dixie*)

***In the tariff discussion the resolution reproduced later was presented and unanimously adopted***

**FORMAL DINNER**

The principal speaker at the formal dinner was O. H. Cheney and excerpts from his remarks are given later. The title of his address was "That Half Barrel of Cement."

Frank H. Smith, the new President, presided at the dinner and Gabriel S. Brown, the retiring President, acted as toastmaster. Before Mr. Cheney's address B. F. Affleck, President of Universal Portland Cement Co., presided at the burning of the last bond issued to finance the building of the Portland Cement Association building in Chicago. This last bond was paid off on October 1, 1928.

### Banquet Speech Important

"A new era of vitality and usefulness is about to begin for the trade association—in which some of the shackles which have bound it will be loosened; in which the tremendous resources of the most prosperous government in the world will be at the service of industry; in which the government will recognize what the trade association means and help it to mean more."

Such was the declaration made by O. H. Cheney, vice-president of the American Exchange Irving Trust Company of New York and member of the Trade Relations Committee of the United States Chamber of Commerce at the banquet closing the annual meeting.

"The greatest friend the trade associations of this country ever had," the speaker stated, "the man who fought for them when justice was not only blindfolded but deaf—the man who has forged the weapons of economic knowledge for business—has been elected to the presidency of the United States."

He praised the cement association as "probably the biggest trade association in the country—an inspiring model for all industries. The cement industry has been magnificently successful in its warfare in the new competition."

He made a plea for improved trade practices in all industry, and sounded a note of warning against abuses likely to grow out of excess capacity to produce and the fear of idle machinery.

In pointing out some fundamental difficulties in the cement industry, Mr. Cheney called attention to the excess capacity but attributed the real problems of the industry to the *fear* of excess capacity. Practically all the troubles of the industry are due to half a barrel of cement, he said.

"It is the extra half barrel per capita which you have the capacity to produce. Fear of idle machinery is the cause of the craze for volume which seems to have afflicted a large proportion of our business poulation.

"What a good many cement men as well as others have forgotten," Cheney stated, in emphasizing that the top volume often yields no profit, "is that a billion times nothing is still nothing."

The speaker called upon all industries to work, through their trade associations, with the federal trade commission and the government in avoidance of the threatening destructive and cut-throat competition.

"The commission is trying to build a practical structure of business based on co-operation—with a law designed primarily to uphold the idea that competition is the life of trade. The antiquated laws regulating business which are based on the economics of the horse-hair sofa and mustache-cup period must go," he stated.

"The more American business co-operates in building up the constructive work of the federal trade commission by self-government, the sooner can we wipe out the destructive influences of the regulatory statutes."

"Now is the time to strengthen your organization for this most strenuous period of its existence," Cheney charged, in concluding his address. "You will need more research—the kind which developed high early strength concrete. You will need more promotion—the kind which is developing an almost immeasurable market by helping the farmer to work more efficiently and live more comfortably. You will need more education—the kind which teaches every man who uses cement that the reputation of a vast industry is in the hands which control the mixing."

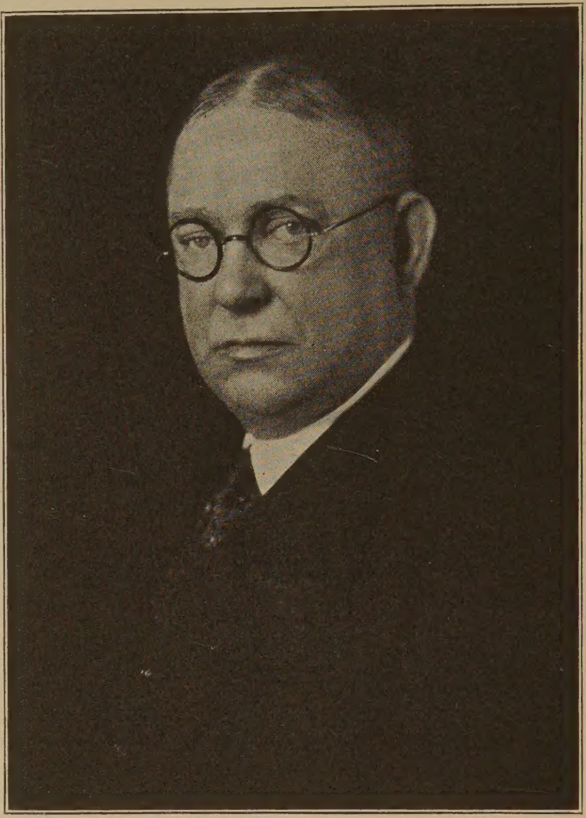
### New President's Address

"There is danger of a severe rupture in the prosperity of the country if a broader and more unselfish attitude is not maintained in all industries," declared Frank H. Smith in his speech of acceptance as new president of the Portland Cement Association.

Mr. Smith addressed the closing session of the Association's annual meeting.

"Voluntary curtailment of production in industries largely overbuilt is generally recognized as essential and necessary to the proper conduct and well-being of any given industry," the speaker continued.

He alluded to the over-built condition of the cement industry and the menace of imported cement as serious problems requiring the utmost co-operative effort on the part of Association members for equitable solution.



*Frank H. Smith, new president*

"We need a protective tariff, not a competitive one, if the present wage scale and the American standard of living are to be maintained," Smith claimed. "We are entitled to this protection and I am of the opinion it will come to us if we can have the whole-hearted support of the entire industry."

### Tariff Discussion

At the close of the meeting, a resolution was adopted calling upon the Ways and Means Committee of the House of Representatives and the Finance Committee of the Senate to undertake an immediate examination, in the next Congress, into conditions which justify a duty on cement. The threat to American standards of living of the imported product, produced under a wage scale many times lower than in America was emphasized.

The complete text of the resolution, which was passed unanimously, follows:

"WHEREAS, both political parties stated in effect in their campaign platforms and public announcements that they would examine and where necessary revise schedules covering certain industries which cannot now successfully compete with foreign producers because of lower foreign wages and a lower cost of living abroad, which characterization describes the cement industry, and

"WHEREAS, the next Congress probably will meet in extraordinary session in the spring of next year,

"BE IT RESOLVED, that the Portland Cement Association in annual convention assembled, urges that the Ways and Means Committee of the House of Representatives and the Finance Committee of the Senate undertake immediately to examine into conditions which justify a duty on cement, now on the free list, in order that American cement may be protected from competition by foreign cement produced under a wage scale which American standards of living forbid and transported to the American seaboard at lower freight rates than domestic producers must pay to reach the same markets.

"BE IT FURTHER RESOLVED, that the cement industry seek the active support of members of Congress to obtain a tariff duty on cement at the earliest session of the next Congress."

### Retiring President's Address

Estimating 1928 shipments of portland cement will total 175 million barrels, G. S. Brown, retiring president of the Portland Cement Association, declared in his annual address in Chicago on November 21st that in spite of the reduced rate of increase over 1927, there is no reason to believe the future outlook is affected.

"The reduced rate of increase reflects very definitely such factors as the slump in building awards during the latter half of 1927, which left a correspondingly smaller construction hang-over for 1928," Brown said. "It does not mean that less new business has been developed during the present year or that the future outlook is affected. On the contrary, it is probable there will be a larger carry-over for next year than was available for shipment in 1928.

"In a number of districts new producing capacity has come in and in all districts we are able to make considerably more of our product than we have been able to sell. Nevertheless, I am of the opinion that those companies whose properties are modern and commercially well located, are well supplied with raw materials and are well financed and managed, have in all districts but one shown satisfactory returns.

"This statement must be modified for those mills which ship largely into sea-coast territory where low priced foreign cement has forced even the best equipped mills to sell for cost or less," he continued.

Mr. Brown spoke before the twenty-sixth annual meeting of the Portland Cement Association, in session at the Blackstone Hotel and attended by representatives of manufacturers who produce over 90 per cent of the cement shipped in the United States. The main theme of his address was a review of results of association activity since the war.

"Public confidence in an industry such as ours is largely a question of public understanding," Brown asserted. "The primary objective of our work has been service to the user. Appreciation on the part of users is unquestionably the greatest factor in the accumulation of public good will.

"Perhaps we are inclined to think too little of the service feature of our association. With the growing use and number of uses of portland cement, users have been seeking information as never before. The association as an information bureau, acting for all the portland cement manufacturers, has handled thousands of inquiries which have enabled inquirers to use cement in a satisfactory manner."

## Penn-Dixie Suggests Stockholders Help Remove Cement from Free List

Blaine S. Smith, president of the Pennsylvania-Dixie Cement Corporation, in a recent report to stockholders mentioning the acquisition of the Pyramid Portland Cement Company located at Des Moines, Iowa, states that while the company is on a strong financial basis, foreign competition reduces earnings.

"The seriousness of the foreign competition is evident from the following:

"Belgian cement is made at wage scales approximately one-quarter of those prevailing for American cement and production costs conform to standards of living in that country which are far lower than American standards. On this account the American manufacturer is unable to meet this competition profitably. Cement is on the free list of the tariff law and cannot therefore be aided by presidential actions.

"The cost of transporting cement from Belgian cement plants to certain American ports on the North Atlantic coast is considerably less than from the principal American producing centers to the same ports. In respect to certain South Atlantic ports, cement can be transported from Belgian plants to these ports for about half of the transportation cost from the principal producing centers in this country which serve those ports.

"The effective way to correct these conditions is by the enactment of tariff legislation providing for a duty on cement which equalizes the difference in production and transportation costs in this country and abroad. Both political party platforms pledge remedial action (report was issued previous to Nov. 11th) and efforts are being made to impress candidates for Congress with the urgent necessity for such tariff relief at the earliest practicable time. The effect of this effort will depend largely upon the number and the interest of those who voice it. Your help with your Congressman and others will be effective and anything you do will be appreciated."

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## Signal Mountain Asks Lower Rate into Florida

A plea for lower rates on cement shipped from Chattanooga, Tennessee, to points in Florida, has been filed by the Signal Mountain Portland Cement Company before an examiner for the interstate commerce commission in Chicago on October 27th. Lower rates and a refund of alleged excessive back charges from the Alabama Great Southern and other southwestern railroads are asked.

The company bases its complaint on the commission's ruling of April 14, 1928, which puts all rates on cement into Florida on a mileage basis. This mileage basis, because of the distance from Chattanooga to Florida, tends to prevent the company from competing in the Florida market, it is claimed. Return to the basing point system is asked.

---

## Sale of Chelsea State Plant to Come Up Again Before Legislature

Advices from the state capital of Michigan report that the long-proposed sale of the state-owned plant at Chelsea will be sold by the state administrative board if a bill to be introduced to that effect is passed. It is now scheduled to come before the 1929 legislature.

State accounting reports are said to show that the plant is more than $800,000 in debt.

# Classifying Materials by Air Separation

## Principle—Application—Theory—Practical Considerations—Historical Review—Classification—Devices with Horizontal and Vertical Current—Centrifugal Types

By E. C. BLANC

**In Part I of this discussion of the subject of air separation, published in the November issue, the author presented the various theories regarding the classification of materials by air separation. He reviewed the experiments made by previous investigators and then presented his own findings, comparing them with earlier experimental results.**

**In this study, Mr. Blanc refers particularly to the applications of air separation to cement manufacturing processes and, in the latter part of Part I, discusses some of the types of equipment used, particularly those using horizontal and vertical currents. In Part II, he continues this study by discussing the centrifugal and combined types of air separators.**

**Because the subject of air separation is of growing importance to cement manufacturers, they will find much of value in Mr. Blanc's researches.**

AIR separators of the centrifugal type are illustrated in Fig. 5. The material to be classified falls onto a horizontal rotating throwing plate. The particles are thrown by the centrifugal force and meet with a resistance on the part of the surrounding air, which is proportional to their surface. If a series of concentric receptacles is placed around the plate, it is possible to recover separately particles of different sizes, the fines remaining near the center, while the coarse particles are thrown farther.

If $R$ is the radius of the plate, $\omega$ its angular velocity, a particle of matter $M$ assumed to be spherical with a radius $r$ and specific gravity $\delta$, when placed on the plate and near its center, will be acted upon by the force of gravity $P = mg$; by the centrifugal force $m\omega^2x$ ($x$ being the distance from the center); by the friction along the surface of the plate $T = mgf$ (where $f$ is the co-efficient of friction) and finally by the air resistance $F$ which, according to Stokes' law, is:

$$F = 6\pi r n V$$

The relative velocity with which the particle $M$ will reach the edge of the plate will be:

$$V_r = \left(\frac{\omega^2 R - gf}{4.5n}\right)\frac{\delta}{g}r^2$$

The tangential velocity along the edge being:

$$V_t = \omega R$$

The absolute velocity will be:

$$V_a = \sqrt{V_r^2 + V_t^2}$$

***Example:*** If $R = 45$ cm.;

$\omega = 18.85$ rad. sec. (180 rev. per min.)

$f = 0.1$;

$n = 1.714 \times 10^{-7}$ at 0°;

$\delta = 2.5$ (quartz);

then the value of $V_r$ as a function of $r$ becomes:

$$V_r = Ar^2, \text{ with } A = 52{,}500.$$

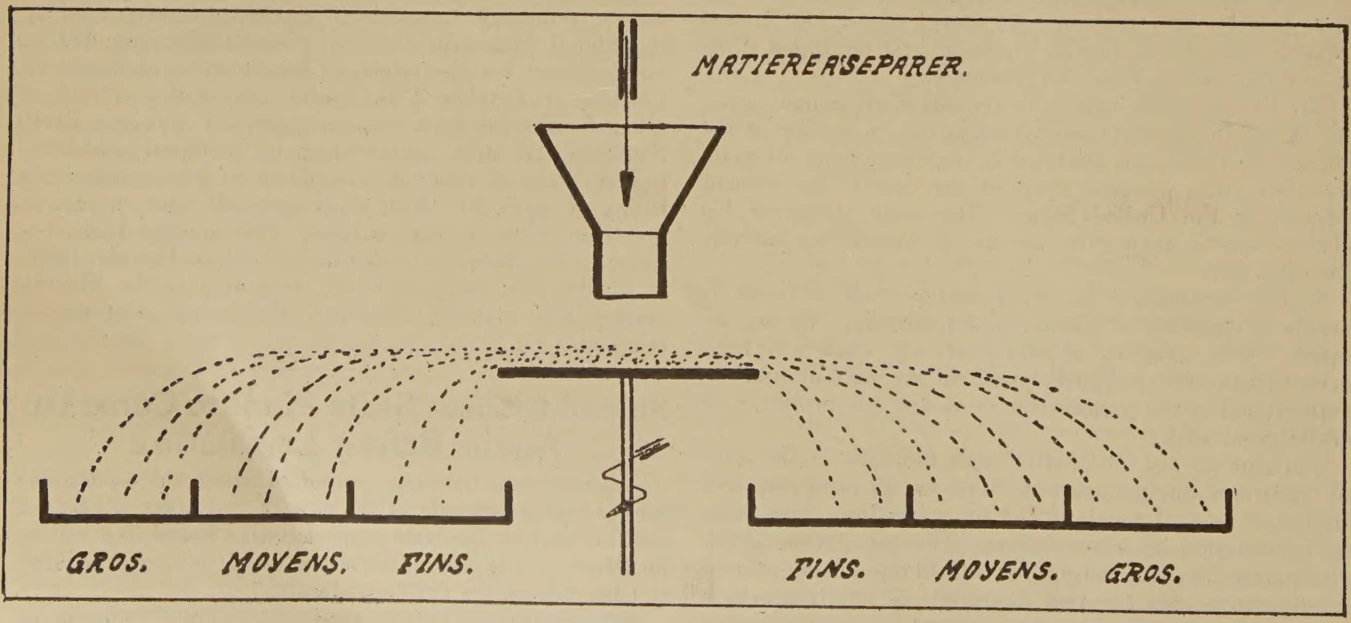

*Figure* 5

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Translated from *Rev. des Materiaux de Constr. et de Trav. Publics.*

Following is a table computed for varying values of $r$:

| | | |
|---|---|---|
| $r = 0.0005$ cm. min. size; | $V_r = 0.013$ | cm. per sec. |
| 0.005 cm. sieve No. 180; | 1.30 | cm. per sec. |
| 0.01 cm. sieve No. 80; | 5.25 | cm. per sec. |
| 0.04 cm. log. average; | 84.00 | cm. per sec. |
| 0.1 cm. sieve No. 10; | 525.00 | cm. per sec. |
| 0.25 cm. max. size. | 3280.00 | cm. per sec. |

In each case the tangential velocity is as follows:

$$V_t = \omega R = 850 \text{ cm. per sec.}$$

Therefore, within the range of sizes which are dealt with in air separation, $V_r$ is negligible and we obtain:

$$V_a = V_t = 850 \text{ cm. per sec.}$$

In the above computation each particle was treated separately. In reality, the separator receives a given quantity of material composed of a range of sizes; for example, with radius varying from 0.0005 to 0.25 cm. In accordance with certain theories of grinding, the particle of average size will have a radius equal to the logarithmic average of the two extremes:

$$r_{ave} = \frac{r_{max} - r_{min}}{\log_e \dfrac{r_{max}}{r_{min}}}$$

In the case of the preceding example, the average (r) is equal to about 0.04 cm. It is quite evident that the friction of the particles against each other will result in a negative or positive charge which tends to bring the extreme velocities closer to that corresponding to the average diameter in question. The separation will thus be less accurate than appears in the computations.

Upon leaving the throwing plate, the particle $M$ assumes a course in a vertical plane determined by $V_a$. This plane is tangent to the plate for small particles and almost radial for the coarsest particles. $M$ is acted upon by the force of gravity: $P = mg$; its initial velocity $V_a$ and the air resistance $F = 6\pi r n V$. It is possible to compute as a function of $r$ the distance $x$ from the edge of the plate beyond which the path becomes vertical and, consequently, to determine the various zones of separation in still air.

## Curve of Drop

According to A. Tenot, the equation of the curve of drop is as follows when

$$A = \frac{4.5 \, gm}{\delta r^2}$$

$$y = \frac{g}{A_2}\left[\log_e\left(1 - \frac{Ax}{V_a}\right) + \frac{Ax}{V_a}\right]$$

and the derivative at any point:

$$\frac{dy}{dx} = \frac{g}{AV_a}\left(1 + \frac{1}{1 - \dfrac{Ax}{V_a}}\right)$$

when the drop is vertical:

$$\frac{dy}{dx} \rightarrow \infty$$

which is the case when

$$\frac{Ax}{V_a} \rightarrow 1:$$

or when:

$$x = \frac{V_a}{A}$$

Returning to the foregoing examples, we obtain the successive values:

| | | Cm. |
|---|---|---|
| $r = 0.0005$ | $A = 1{,}210{,}000$ | $x = 0.0007$ |
| 0.005 | 12,100 | 0.07 |
| 0.01 | 3,020 | 0.28 |
| 0.04 | 189 | 4.7 |
| 0.1 | 30.2 | 33 |
| 0.25 | 4.85 | 700 |

Devices making use of this principle alone have been few and are obsolete today. They were designed for the classifying of minerals (centrifugal separators of Barager). To achieve a normal separation, one must operate with very large diameters, of 15 to 20 m. Aside from the clumsiness of such equipment, it is apparent that the collection of the product would involve considerable difficulties.

This fourth type of separator combines the two latter types discussed and operates through centrifugal action in an upward current of air. These installations have received widest application and are of much greater interest. They occur with many variations. All of these have evolved more or less directly from the separator invented by Mumford and Moodie (French patent March 3, 1885) and designated generally by the name of its first builder as "Pfeiffer."

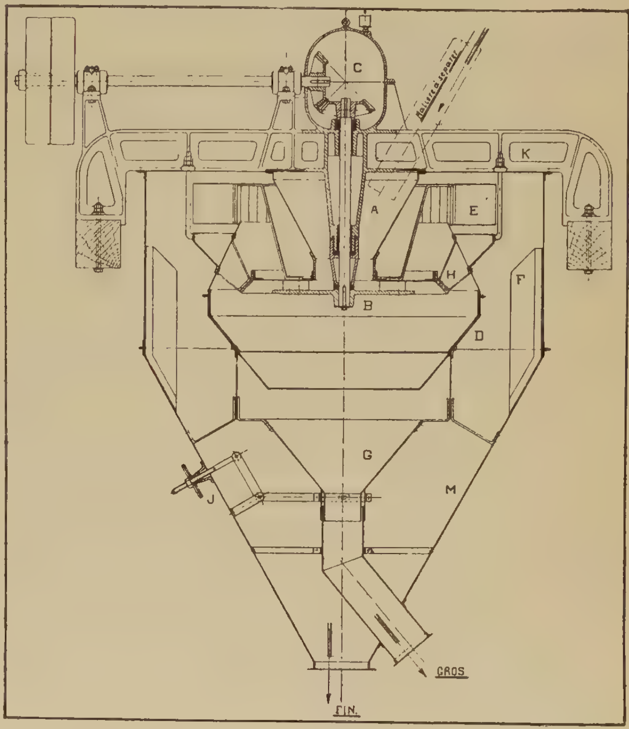

*Figure 6*

This separator has been perfected and presents a very simple machine giving satisfactory operation.

Fig. 6 shows an air separator of the "Arbed" type. The path of the material can be easily followed on the drawing. The material to be separated falls through a central conduit (A) on a centrifugal plate (B), to which motion is transmitted by a vertical shaft and gears (C). The centrifugal plate throws the material against the inner sheet metal wall (D). A fan with vertical axis (E) is connected to the throwing plate and turns with it. It creates an upward air current which passes through the spray of material leaving the plate and carries away the fine particles. These fine particles are then thrown against the outer wall (F), where, by the combined action of settling, centrifugal force and friction against the wall, they become deposited along the latter and slide down into the hopper (M) at the bottom where they are collected. The purified air returns to the central chamber through the opening between the wall (D) and the lower hopper (G). As a rule this opening is adjustable. It is during this period of its course, that the air encounters the coarse particles becoming deposited in the central funnel. It can stop the remaining fines and carry them away with the rest.

It is evident that the construction of these devices is relatively simple. The few moving parts are supported independently by substantial castings. The parts subject to wear such as bearings, gears, etc., are very effectively protected from the dusts. Finally, while the machine represents a completely closed block, it offers easy and rapid access to its interior parts. These are the characteristics, if not of all air separators, at least of all those which are carefully and properly designed.

Table V gives the current sizes of Arbed air separators and their properties.

TABLE V.—AIR SEPARATORS

| | | | | | |
|---|---|---|---|---|---|
| Inside diameter of the chamber—m. | 1.50 | 1.80 | 2.10 | 2.50 | 3 |
| Number of rev. per min. | 200-300 | 200-260 | 180-220 | 160-200 | 140-180 |
| Power required—h.p. | 2-3 | 3-4 | 4-5 | 5-7 | 8-12 |
| Approx. weight—kg. | 1000 | 1500 | 2500 | 3250 | 4250 |
| Approx. hourly cap. in kg. of fin. prod. | 500-800 | 1200-1500 | 2000-2500 | 3000-3500 | 4000-7000 |

The output indicated above applies to cement and materials of similar density (density 2.5 to 3) adjusted so that the fine product does not leave more than 1 per cent residue on the No. 80 sieve and 12 to 15 per cent residue on the No. 180 sieve.

The dimensions of these devices are determined by experience and their selection is based on empiric knowledge alone.

The analytical study of the path of a particle could be continued by returning to the equations of the centrifugal separator studied above and by considering the vertical force of the ascending air current of velocity $V_x$ acting on the particle when it leaves the centrifugal plate.

This path must be distinctly upward to avoid the interior wall of the separator or, at least, to meet it at a small enough angle. Otherwise, the fine particles will become precipitated with the waste.

The velocity $V_x$ must, therefore, be infinitely greater than those computed for simple separation in an ascending current (Table II).

Thus, as a result of calculations which cannot be given here in detail, the separation of particles of the No. 200 sieve ($d = 0.073$), whose rate of drop in air is only 0.30 m. per second, in a centrifugal air separator of the type illustrated in Fig. 6 requires an air velocity of the ascending current of 10 to 15 m. per second.

Assuming the above to be established, let us proceed to use these data in checking the dimensions of a given device. We will assume an air separator as in Fig. 6 with 2.500 m. diameter, which served as basis for all our computations. The fan has the following properties:

Outside diameter $r_2 = 0.95$ m.; width of blades $l_2 = 0.25$ m.; angle of blades with the tangent $B = 57$ deg.; number of revolutions per minute, 180.

Peripheral velocity $u_2 = 18$ m. per second.

The circular cross section wherein separation takes place has an average area of 0.700 sq. m.

Assuming an upward velocity of 15 m. per second in order to obtain a separation equivalent to a No. 180 sieve, the flow of air at the entrance is:

$$Q = 0.7 \times 15 = 10.5 \text{ cu. m. per sec.}$$

The relative velocity of air on leaving the fan will be:

$$W_2 = \frac{Q}{2\pi r_2 l_2 \sin B} = \frac{10.5}{2 \,.\, 3.14 \,.\, 0.95 \,.\, 0.25 \,.\, 0.835} = 8.35 \text{ m.}$$

which permits the computation of the total manometric pressure (that is, since this is a closed circuit, the total resistance of the device)

$$H = \frac{u_2^2 - w_2^2}{2g}$$

$$= \frac{18^2 - 8.35^2}{2 \,.\, 9.81} = 13 \text{ m. of air} = 16.7 \text{ mm. water}$$

This is quite possible. Yet since the latter constant is essentially a function of the design of the apparatus and difficult, if at all possible, to determine in advance, the reverse computation is not possible and there is no theoretical method of determining the future quality of the work of a separator. Recourse is taken to acquired experience, as well as the number and the efficiency of regulating devices provided, which play an important part in the establishment of separators. This leads us to a study of the means of regulation.

These can be classed in three groups:

1. Those regulating the cross section through which the air current passes.
2. Those regulating the path of the material.
3. Those regulating the flow of air from the fan.

The regulation of the cross section area is not efficient in most cases. Such regulation results in two actions which tend to balance one another. By reducing the cross section, the velocity should naturally be increased at that point. Yet it also results in a loss of some of the charge (dust) with consequent reduction in output, which tends to impart to the velocity a constant value. Thus, we have often observed that regulation by means of trap valves, etc., has no appreciable effect on the fineness, except when they are nearly closing the cross section, in which case they stop all flow.

Regulation of the path of the material is more efficient. It is shown in Fig. 6. Ordinarily the material is thrown by the centrifugal plate against a conical screen (H) which deflects it downward. Thus the particles meeting the ascending current of air have an initial downward velocity, which is added to the effect of their weight. Consequently, particles whose velocity in free air is equal or even slightly higher than that of the ascending current, will reach the wall (D) and become carried away with the waste.

On the other hand, if the screen (H) is made up of horizontal plates K, the material thrown by the centrifugal force will fall directly against the central portion of the wall (D). Thus the ascending air current will meet the particles in their horizontal path, without initial downward velocity, and will carry them away more easily.

Experience has sanctioned this reasoning. Below are given data obtained on a separator of 2.500 m. handling artificial cement dust.

| Position of screen | Lowered | Intermediate | | Raised |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Per cent of the separated fines retained on sieve with 4900 meshes per sq. cm. | 20 | 24 | 29 | 32 |

Finally, the most efficient control can be exercised by regulating the flow of air, i. e., the speed of the fan. Here again we encounter two effects which tend to balance one another, for the speed of the centrifugal plate is unfortunately also that of the fan (except in certain special devices such as the J. D. Mary system, where the centrifugal fan and the distributing disc have independent drives). In ordinary separators, the reduction of the number of revolutions of the fan, which decreases the flow and thus the velocity of the air and, consequently, increases the fineness, is accompanied by a reduction of the centrifugal action on the material, which facilitates its carrying away by the air current.

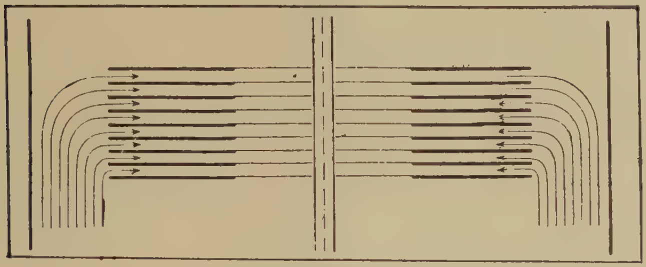

*Figure 7*

Yet these two effects are not equivalent and it is possible to regulate the fineness of the product by varying the velocity.

Does this mean that these devices should be provided with driving mechanisms permitting several speeds? Not at all, in most cases. When a certain speed is obtained which corresponds most closely to the desired result, this speed can be maintained providing the product remains uniform.

A centrifugal air separator of this type yields a product which can be adjusted to a fineness of 15 to 18 per cent retained on the sieve with 4900 meshes per sq. cm.

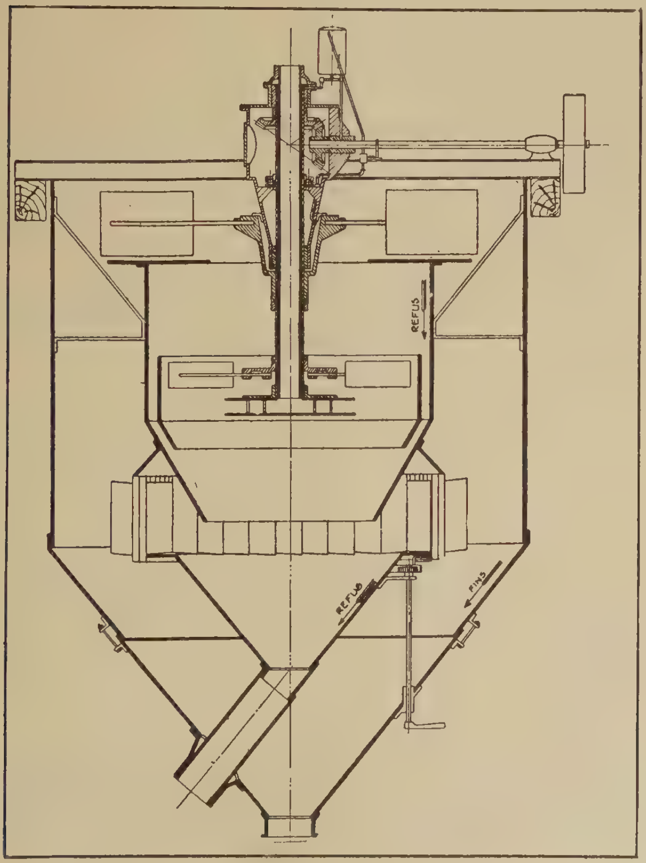

*Figure 8*

By slightly reducing the speed, and consequently the flow, this fineness may be increased from 8 to 10 per cent retained on the same sieve. If a finer product is desired, recourse must be taken to some other devices which will be described in a general way below.

One of the first among these is the Moodie-Pfeiffer classifier (1907 patent), whose principle is illustrated in Fig. 7. Its general construction is similar to that of the centrifugal air separator of the same inventor, but a close series of parallel plates is placed between the distributing disc and the fan revolving with these and forcing the air loaded with dusts from the circumference to the center. According to the inventor all coarse particles would come in contact with one of the plates and would be rejected by the centrifugal force.

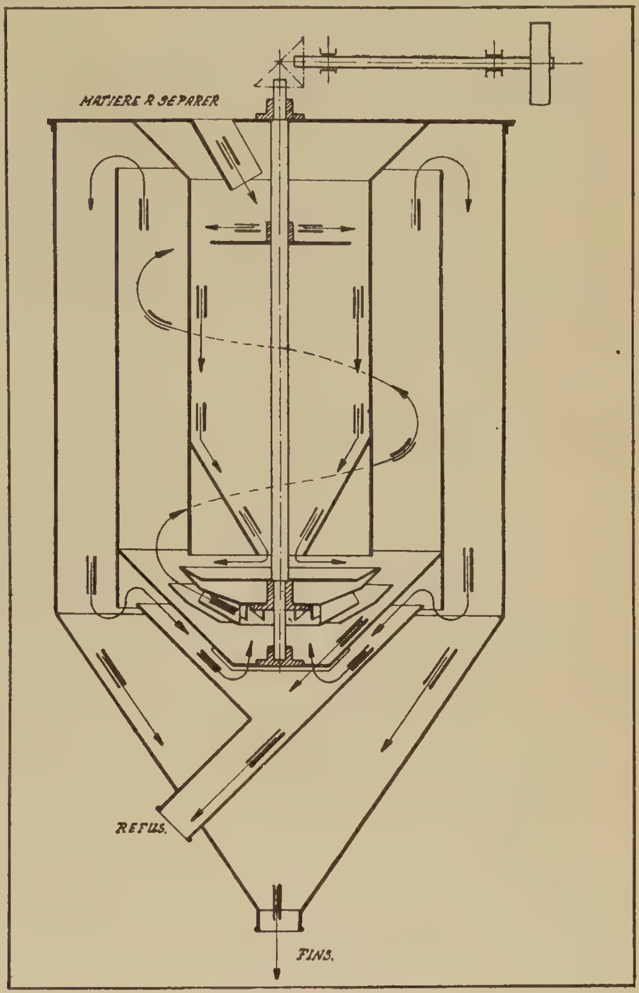

*Figure 9*

The Gayco-Emerick separator (Fig. 8), worked out in America, reserves a more important part to the centrifugal force. The distributing plate is placed considerably below the suction fan and has a small auxiliary fan directly above it, which creates a helicoidal current in the central chamber. The coarse particles are thrown against the wall and slide into the hopper below. Only the fine particles are carried away by the suction. This device has been modified several times, yet seems to have given good results. The Gayco separator has been furnished in very large sizes: up to 4.200 m. in diameter with outputs of 15 to 30 tons per hour.

The Taifun separator (Fig. 9) makes use of helicoidal current created by a fan placed directly below the distributing plate. Given a considerable height of the separation chamber, this apparatus can yield impalpable products. Yet its output is rather low: about 500 kg. per hour for a separator of 2 m. diameter.

In conclusion, we will suggest a formula permitting a comparison of the efficiencies of the different systems of separation by air and otherwise:

If *A* is the per cent fines contained in the initial product;

*B* the per cent coarse (A ÷ B = 100);

*C* the per cent fine carried away with the coarse product of the separator;

*D* the per cent coarse (C ÷ D = 100), we obtain):

$$\text{Efficiency } E = 1 - \frac{BC}{AD}$$

***Example:*** A separator of 2.5 m. in diameter receives a hydraulic lime, of which 46 per cent (A) passes the 4900-mesh sieve and 54 per cent (B) is retained on the same sieve.

The fine product leaves 8 per cent residue on the 4900-mesh sieve, while the waste contains 11 per cent (C) dust passing the 4900-mesh sieve and 89 per cent coarse material (D).

The efficiency of the separator is: $E = 1 - \frac{54 \cdot 11}{46 \cdot 89} = 0.85$. In another case (a 2.5 m. separator handling cement), we have A = 15 per cent; B = 85 per cent; C = 5 per cent; D = 95 per cent. (The fine product in this case leaves 20 per cent residue on the 4900-mesh sieve). The efficiency is:

$$E = 1 - \frac{85 \cdot 5}{15 \cdot 95} = 0.70.$$

The efficiency of the best separators rarely exceeds 0.90.

## American Standards Association Established by Unanimous Vote of Member Bodies

Unanimous approval by the thirty-seven member bodies of the establishment of the American Standards Association to succeed the American Engineering Standards Committee is announced by William J. Serrill, assistant general manager of the United Gas Improvement Company of Philadelphia. Mr. Serrill was chairman of the Standards Committee, and now becomes president of the American Standards Association. One of the most important results of the abandonment of the committee form of organization will, according to Mr. Serrill, be a much greater degree of participation by trade associations in the direction of the national industrial standardization movement.

One of the first acts of the association will be the organization of a board of directors composed of twelve industrial executives. This newly created board, which was established in recognition of the increasing part which executives are playing in the standardization movement, will control the general administration and policies of the association. The old Main Committee, made up of representatives of all the member bodies, now becomes the Standards Council, and in its hands will rest all matters connected with the adoption and approval of national standards.

The officers of the association are, in addition to Mr. Serrill: Vice-president, Cloyd Chapman; secretary, P. G. Agnew, and assistant secretary, F. J. Schlink. The advisory committee of industrial executives includes: J. A. Farrell, president of the U. S. Steel Corporation, chairman; George B. Cortelyou, president of the Consolidated Gas Company; John W. Lieb, senior vice-president of the New York Edison Company; L. F. Loree, president of the Delaware & Hudson Company, and Gerard Swope, president of the General Electric Company.

## Census Shows Cement Industry Lagging

That the cement industry has not been advancing over the past two years is shown by the results of the biennial census of the Department of Commerce according to a item published in the "Wall St. Journal" of November 12th. While there were 161 establishments reporting last year, compared with 145 in 1925, the preceding census year, the value of products of $293,565,293 reported for 1927 was a decrease of 2.4 per cent from 1925, it is stated. Value of products added by manufacture of 173,756,304 barrels also showed a decrease from 1925, of 6.9 per cent. Cement prices have been declining, for although 173,206,513 barrels of portland cement, by far the most important product of the industry, were produced in 1927, compared with 161,658,901 barrels in 1925, the value decreased from $293,964,730 in 1925 to $287,431,268 last year. Other cements and products of the industry amounted to a little more than $6,000,000 in value, which was also a decline from 1925.

The total of 36,292 wage earners in the industry last year was a 5.6 per cent decrease from 1925, and wages paid decreased 1.3 per cent, indicating a higher wage scale last year. Cost of materials last year showed an increase of 4.9 per cent.

The annual survey of the National Association of Manufacturers furnishes comparisons between current conditions and 1927, and the picture is not an especially bright one. Present trade is regarded as excellent by only 10 per cent of the manufacturers in the industry, while 30 per cent regard it as good, 40 per cent as fair, and 20 per cent as poor. Fifty per cent regard present business as worse than at this time last year, better, 20 per cent, and unchanged, 30 per cent. The outlook for the winter is regarded as poor by 40 per cent of the manufacturers, while only 10 per cent regard it as excellent, 20 per cent good, and the rest fair.

About half report a small increase in wages over last year, and a small decrease is reported by the remainder. Sales values are considered lower by 67 per cent, while the rest report an increase.

## Investigate Health Hazards of Cement Plant

The health hazards of a cement plant have been made the subject of a three-year investigation in the middle west by a Dr. Thompson. Contrary to expectations, the consumption rate was not found to be high. The amount of lime in cement plant dust is given credit for this satisfactory condition. The pneumonia rate was also found to be low.

Among the diseases which were unusually prevalent were the common cold and acute bronchitis or acute colds on the chest. Skin troubles were found to affect many employees, particularly in warm weather and digestive disorders were found prevalent, with rheumatism causing much sickness absenteeism.

# Sowing Seeds of Safety in the Major Departments of a Company

### *Some Observations Regarding Methods Used to Develop Enthusiasm for Accident Prevention—History of Safety Efforts at Lehigh Plants —Co-operation of Executives Necessary*

By HENRY A. RENINGER
Special Representative, Lehigh Portland Cement Company, Allentown, Pa.

TWENTY years ago safety in industry was practiced by very few concerns. Ten years ago the National Safety Council was becoming established and known. Many people, even at that time, felt that safety was a theory and not practical, but the Compensation Laws compelled them to make necessary revision in equipment and design, to guard the dangerous parts of machinery which had in the past been responsible for many serious and fatal injuries. Large sums of money were spent, and while accidents were reduced they were not reduced to the extent which had been looked for and we began to realize that the guarding of machinery was not the most important part of safety work. The education of the executive, department heads, superintendents, foremen and employees, was the big problem.

In giving you this informal talk I, perhaps, am bringing out some of the problems that I ran up against in my own organization, but I believe they will be of interest, for it will give you a general idea of what group plant supervisors are up against in a fair sized corporation, with plants scattered in various parts of the country.

## Started in 1915

We had more or less carried on safety work and had organized committees in 1915. From 1916 to the end of the war there was no general supervision of the work, but the safety committees functioned and did certain jobs, as protecting and guarding machinery and complying with any rules and regulations issued by the insurance company or state inspectors. However, the results had been more or less unsatisfactory and after the war, upon my return, I was told to carry on this work and organize it and see whether we could not cut down the toll of accidents which cement plants were then having.

Perhaps the simplest way to get a department started is for the president of the corporation to issue a letter to all departments and plant superintendents, announcing the creation of a safety department and instruct all departmental heads to co-operate. By so doing all officials know that this work is approved by the head of the organization. From then on it is the duty of the safety director to sow the seeds of safety among all departments and persons directly affected by this new program. It means that the safety director must keep a full and complete record of all accidents and the cause of the same; that he must put this information in such shape that it can be read by the chief engineer, the executive officials of the company, plant superintendent and department heads.

Sowing seeds of safety can be done in many ways and I don't believe that just the sending of reports to these various officials is the best means of bringing this to their attention. Personal contact with the various department heads and executives, the telling of the story of an injury to an old employee or the fact that an employee was killed, leaving his wife and several children to be taken care of by others, is one of them.

Naturally the treasurer or comptroller of a company will be interested in safety from the financial standpoint and reports showing cost of accidents, cost of compensation insurance, etc., will interest him because that is his particular duty.

After years of experience we are able to compare one year's cost with another and where you show a saving and accumulate a surplus they will begin to realize that safety is not a fad but is a real saving.

How can we interest the principal departments in a big organization? The engineering department, for instance: I find that the material of greatest interest to the engineering department is reports and charts showing accidents, days lost; also man hours and days lost per 100,000 man hours with a curve showing production.

A ten-year report that has just been worked out showing all these figures has proven very interesting not only to engineering but to all departments. However, reports of this kind do not mean very much to sales, traffic, advertising, and they must be reached in a somewhat different way. Our engineering department appreciates reports and charts and it is also the duty of the department of safety to keep them advised on any new laws and regulations in various state departments; to furnish them with copies of any new codes. Our engineering department receives a copy of every Safe Practices Pamphlet issued by the National Safety Council, and we find that they make use of these safe practices many times in the designing and construction of new buildings. We also keep them advised in regard to anything new in the way of fire protection and fire prevention. Any new inventions that will improve the safety of any machinery in use are also furnished to the department.

## Co-operating with All Departments

In regard to the purchasing department, we also try to keep them advised of anything that is new and the engineering and purchasing departments work with the department of safety in seeing that new machinery being purchased has all the proper safeguards. Any help that the safety engineer can give to any of these departments is appreciated, and after gaining the confidence of these departments you will be called in from time to time to make recommendations.

The traffic department's interest and co-operation was aroused through the report of the safety department showing the number and bad order in which cars were received at the various plants and which were hazardous in unloading. Every accident, where a man is hurt in unloading cars due to faulty equipment, is referred to the traffic

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A paper presented at the Seventeenth Annual Safety Congress.

department, and this report, through them, is forwarded to the railroad. By having our traffic department take an active interest in this work we find that the rolling stock coming into our plants from the mines is in better condition than ever before.

The sales department, in many ways, has no connection with the safety department. They are employees who are not exposed to the hazards of a plant and their main job is selling. However, they recognize the safety department for the simple reason that every employee's registration card must be made out and sent to the department of safety, who also handles personnel records. Interesting bits of information are sent to them from time to time. Every salesman on the road driving a car was furnished with a set of Safe Driver's Practices, with a letter accompanying the set advising them that, at the request of the vice-president, this was being forwarded to them for their information and study. All accident reports, of course, are handled by this department and all minor injuries to office employees are treated in the department; all departments call upon us in emergency cases, whether sickness or accident.

When the class of student salesmen were about ready to go out on the road and to spend a certain number of weeks in dealers' yards, the sales department asked our help and to talk to these men on the hazards they would run up against in the material dealers' yards. We were only too glad to give them a forty-minute talk, and found all of the salesmen very much interested in the subject, so much so that many of them have written in for further information on the subject of safety, fire prevention and housekeeping in yards.

The handling of all accident reports for the salesmen on the road has tied in these men, with the result that, from time to time, this department is able to render a service here or there for them and receives due recognition.

### Co-operating with Individuals

The personality of the safety director must be such that he is on friendly terms with all officials and department heads and he must take advantage of every opportunity to tell the officials interesting stories of things happening in and around the plants. This must be done in such a way that it does not become tiresome. He must have at his fingers' ends the facts and figures—number of man hours worked, number of man hours lost, cost in dollars and cents; also the amount of savings. He must remember at all times, however, that these various department heads have problems of their own. The superintendent and manufacturing departments have their daily problems and safety is just another one that is added to the burdens which they already have; therefore, he must sell this idea in a way that will bring them to feel this job is one that must be done, not under compulsion, but because they have been shown it is of benefit to them in their production work. He must not assume the attitude that he can command attention and conformities to the rules because the chief executive has issued an order that safety must be carried on—if he does he will not get very far.

The chief engineer, the chemical engineer and the sales manager are not hired to help the safety director—they are hired to work out their own problems and carry on their own work, but it is necessary that the safety director so interest them in his department that they will be only too glad to work along with him.

Sowing seeds of safety is like sowing seeds on a field with a very high wind blowing. They do not always land where they are intended to, but are scattered sometimes to the four winds and many times take root and grow where least expected.

There is no question in my mind that the safety director has one of the most difficult jobs in a company. He must show the sales department that safety helps them in selling the product; also the advertising and other departments that it is helping them in their work.

Accidents are expensive and they do not make profits for the company. Many companies do not know the cost of accidents because they do not keep accurate records, but where these costs are known and by safe practices accidents are prevented, the work of the safety department is shown to be a benefit to the company in a financial way and its recognition is assured.

When a report can be shown where a plant was spending from five to ten thousand dollars for compensation, medical and hospital each year for a period of five years, and then for the following five years a report shows they only had three lost-time accidents, with one compensation case, with the saving running into tens of thousands of dollars, all department heads will sit up and take notice.

Reports should be made interesting, simple, and not tiresome. If they do become tiresome they will not be studied.

There is no question in my mind that in every organization we have different problems—different types of department heads to handle, and every safety director must work out his own problems. Every safety director must be a lifter, not a leaner. It is his job to be of help wherever possible to any department at all times; the less favors he asks and the more help he can give, the better his reputation with the various departments.

## Idaho Plant at Inkom to Be Ready Before Spring

Completion and operation by March 15th of its plant now under construction at Inkom, near Pocatello, Idaho, is anticipated by the Idaho Portland Cement Company. Concreting of the 150-ft. stack has been about completed. Bases for the crushing plants are under way and the machine shop was completed late in October.

The Oregon Short Line, which will serve the plant, has a crew of men building a bridge across the Portneuf river for a spur track. Another crew of workmen is engaged in bringing three miles of power line to the plant.

E. J. Simons of Spokane, president of the company, visited the site in late October.

## Winter Improvements on Alpha Plant at Ironton Under Way

An extensive repair program has been gotten under way at the Alpha Cement Company plant at Ironton, Ohio, operation being suspended for the winter.

One of the major improvements is the walling of the shaft of the plant mine with cement. The shaft is approximately 560 ft. deep by 12 ft. square and is to be lined solidly with concrete from the surface opening to the mine level. Two electrically operated elevators for limestone are to be installed. Several electric cranes and other apparatus are also included in the improvement program.

## Florida October Shipments

An optimistic note is seen in the shipments made by the Florida Portland Cement Company for the month of October, when they totaled over 71,000 barrels. This is 30,000 barrels more than the monthly average for 1928 and exceeds the best previous month by 12,000 barrels.

# EDITORIAL

## *An Important Change*

THE preliminary figures for 1927 on the cement industry which have just been issued by the Census Bureau show a very encouraging change in the general trend of the industry.

Prior to this report, previous census figures have shown an increase in the number of wage earners from year to year which, if not exactly proportionate to the increase in the output of cement, at least followed that increase with considerable consistency. The figures did not show any particular increase in the rate of the development of mill efficiency.

The figures which have just been released, however, show an entire reverse of the situation. Between 1925 and 1927 the output of portland cement increased 7.1 per cent. The number of wage earners, however, decreased from 38,437 in 1925 to 36,292 in 1927, a drop of 5.6 per cent. This change was accompanied by an increase in horsepower of over 21 per cent, and a very considerable raising of the average horsepower per mill.

This very definite improvement in operating efficiency comes at a very opportune time. It is an indication that the cement industry as a whole is not altogether unprepared for the long term of declining prices with which we are in all probability faced. It denotes quite conclusively a very decided realignment of conditions in order to meet the prevailing buyers' market on terms that will be satisfactory to manufacturers as well as purchasers. To say that this change has been made as a result of a conscious analysis of the present economic situation would perhaps be not quite the truth, but it does seem reasonable to suppose that this very decided change in operating conditions has developed as a result of the way in which the industry as a whole has felt, consciously or sub-consciously, the rapidly developing changes in market conditions. It is rather sound evidence of a basic sensitiveness to business conditions which is expressed by the cement industry in terms other than those of inflation and depression. As long as the cement industry follows along this line of development the change in marketing conditions which is creating the so-called "buyers' market" need not be viewed with any particular apprehension.

After all, the need for basic materials will continue much as in the past, and the true adjustment from the manufacturer's standpoint is such as the cement industry is now making—in other words, an adjustment which permits the manufacturer to meet the new marketing conditions without serious embarrassment to himself.

* * *

## *Overproduction*

MANY industries have benefited from the advice of O. H. Cheney, vice-president of the American Exchange Irving Trust Co. of New York. Now, also, the cement industry has had an opportunity to hear him analyze its ills and prescribe for them.

And, as usual, the prescription is so simple and so logical that it is difficult to realize that the procedure recommended is really what is needed. Surely the troubles that have harrassed the industry cannot be of such a non-dramatic nature. It is as if such a little thing like an ulcerated tooth undermined the health and well-being of the entire body.

And the remedy is similar. Yank the offending tooth out, or, in other words, get rid of this infection which localizes itself in a mad scramble for small additional sales at any cost.

All industry has excess capacity. All industry probably always will have excess capacity. Says Mr. Cheney, it is not the excess capacity that does the harm, but the FEAR of it that causes the mad scramble which results in most of the ills of the industry.

The matter is one of viewpoint and business judgment. If it is true that the average sales cost per barrel of cement for 90 to 95 per cent of the production is down to about 10 per cent or less of the selling price and the cost of selling that additional 5 or 10 per cent is greater than the cost of manufacturing it, surely there can be no profit in increasing sales at such a sacrifice! The manufacturing economy resulting from such a small increase in production will not even approach the losses in sales cost. "A billion times nothing is still nothing," says Mr. Cheney. Nothing is gained if the net profit is zero.

The answer, as Mr. Cheney points out, is simple. Forget that you must have that additional volume that must be secured at such great cost. Sell only the 90 to 95 per cent that can be marketed at a reasonable sales cost—and make a profit on every barrel sold.

It's not so difficult, but oh! how we hate to go to the dentist to have that tooth pulled!

*General view of the plant, taken from the top of the cement storage silos*

# Manufacturing Process at Plant of Yosemite Portland Cement Corporation

## Individual Methods of Preparing Raw Materials—Clay Wash Mill is a Feature—Mixing the Raw Materials Stream—Launder System of Slurry Blending—Kilns—Crude Oil Fuel Used

By J. N. HATCH

***This is the second of two articles describing the plant of the Yosemite Portland Cement Corporation at Merced, Calif. The first article, published in the November issue, described the mountainside quarry from which the limestone used at the plant is received. In this article a complete description of the equipment and manufacturing processes at the plant itself is presented for the first time.***

AS described in the previous installment the limestone is crushed before it is shipped from the quarry. It is delivered to the mill in 40-ton hopper bottom steel gondola cars. The switch track is at an elevation of about 12 ft. above the general ground level. Beneath the track is a concrete unloading bin into which the cars are dumped. In a tunnel beneath this bin is a 24-in. belt conveyor leading up to about 40 ft. above the ground level and over the roof of the raw mill. The crushed rock feeds onto this belt conveyor through an inclined chute without a feeder. The crushed rock is quite fine and is kept so moist that there is no dust. The belt conveyor has a capacity of 240 tons per hour and is on an 18 per cent grade. When clay is being delivered, instead of limestone, the same belt conveyor carries the clay to the top and puts it into storage.

The storage for raw materials is equipped with a crane runway 684 ft. long and 45 ft. high with runway rails on 70 ft. centers on which is operated a Northern Engineering Company traveling crane equipped with an Erie 3 yard grab bucket.

### Materials Storage

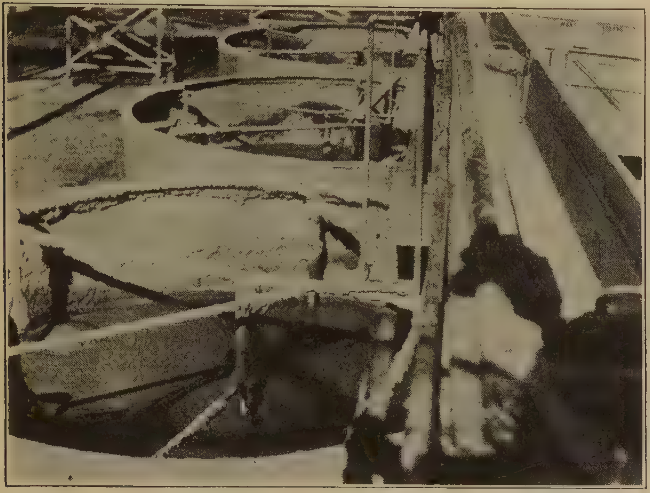
There is a storage capacity of 10,000 tons of crushed limestone, and about an equal amount of clay. Clinker storage is provided the equivalent of 150,000 barrels of cement. Also a section is reserved for gypsum storage.

The crane has a span of 70 ft. and can store, distribute and reclaim all raw materials to and from storage, distribute and reclaim the clinker, and unload the gypsum from cars and deliver it either from cars or from storage to the gypsum feed hoppers in the finish mill.

The limestone can be delivered from the belt conveyor either to the raw grinding mill or into rock storage. If it is to be put into storage it is dropped directly from the belt conveyor through a chute to the rock storage bins. If it is to go to the raw grinding mills it is delivered from the main belt conveyor to a cross conveyor and discharged into one of two steel hopper-bottom feed storage bins over the raw grinding mill. That which goes into the rock storage bin is handled by the traveling crane and spread out in the bin. The clay falls from the belt conveyor into another compartment of the bin, and is reclaimed by the crane and put into a clay storage hopper.

### Clay Wash Mill

The clay is let out of the clay storage bin through three swing gates into the wash mill. This wash mill for clay is a feature of this plant and is seldom found in this country. The clay, which has the appearance of small boulders, is in fact quite soft and dissolves readily in water, so that no grinding is required in the raw state. It is put into a concrete tank 26 ft. in diameter in which is a wheel furnished by the Allis Chalmers Manufacturing Company, driven by a 75 h.p. Westinghouse motor with a vertical axis. The rotation of this wheel slushes the clay in the water until it becomes a slurry. When this slurry has been beaten to the proper consistency it falls into a sump from which it is pumped by a small centrifugal pump to the top of one of six clay slurry tanks. These are steel tanks about 14 ft. in diameter and 25 ft. high. This clay is what is usually known as potters clay and is kaolin which runs about 36 per cent alumina as it comes from the pit. By another system of centrifugal pumps, the clay slurry is transported from the clay slurry tank to the raw mill to be mixed with the limestone for grinding. The clay slurry is about 80 per cent water and 20 per cent clay. In that condition it will stand for 30 days without any appreciable settlement. This clay is finer than could be ground by any mechanical process. The limestone as shipped from the quarry is of so nearly a constant grade that it does not require classification.



*The slurry tanks during agitation*

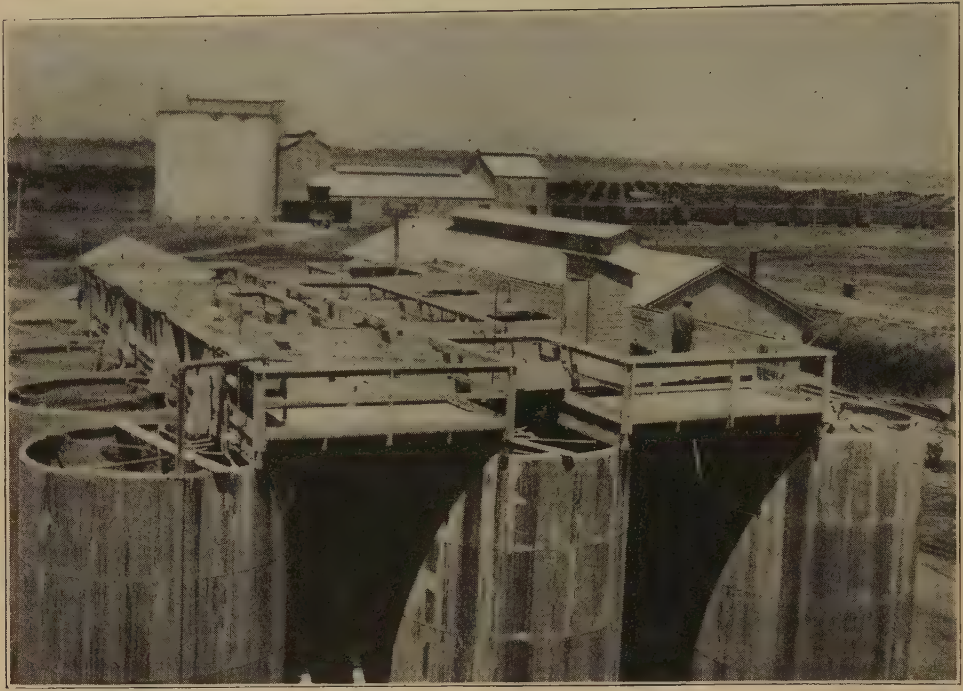
*The slurry tanks are of steel, 14 ft. in diameter and 25 ft. high*

*Crane transferring gypsum from storage to the finish mill feed bins*

### Raw Mill

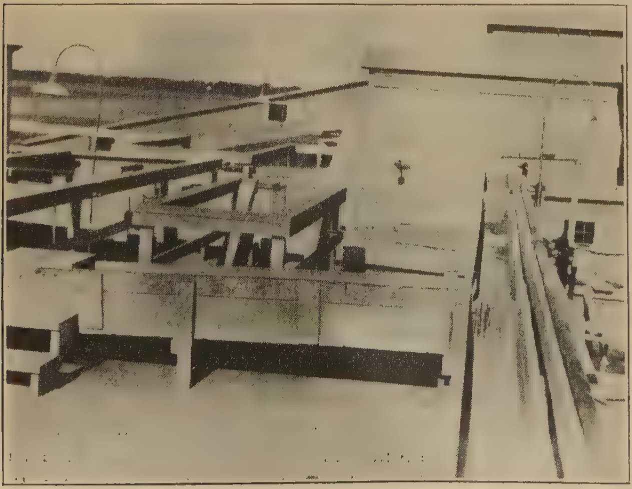
The machinery in the raw mill is the very latest development in cement making machinery. The layout is carefully planned to follow a natural sequence throughout the plant. There are two duplicate raw mills in operation.

These are Allis Chalmers three-compartment wet compeb ball mills, 7 ft. inside diameter by 26 ft. long. The balls in the first compartment are 3 to 5 in. in diameter, those in the second compartment 1 to 3 in. and those in the third compartment ⅞ in., weighing a total of 98,000 pounds. The limestone is fed to the mills from the overhead feed bins by a revolving table feeder. The proper proportion of clay slurry is fed in with the limestone and if more water is required than is contained in the clay slurry a small stream is kept running. The feed of limestone and clay is fed into the first compartment of the mill and as it is ground falls into a concrete sump beneath this compartment, and is gathered up by revolving scoops and discharged into the second compartment, and continues through the mill.



*Top of slurry tanks, showing the launder system for blending the slurry and filling the tanks*

When the grinding is complete, the slurry is discharged from the finish end of the mill at about the consistency of pancake batter. Both of the mills discharge into a common sump, from which the slurry is pumped by a 4 in. Wilfley pump to the slurry storage tanks located nearby.



*Close-up view of the wooden troughs on the slurry tanks*

### Launder System of Blending

There are twelve of these slurry tanks which can be used as either storage or mixing tanks in any order required. Each of them has a capacity of the equivalent of 350 barrels of finished cement. The slurry from the raw mill is pumped up to the top of the slurry tanks and discharged into what is known as the launder system of distribution. This system consists of wood troughs about one foot wide and two feet deep with shut-off gates. The slurry flows through these troughs and can be diverted into any tank desired. In the case of clogging, the troughs can easily be cleaned with a shovel. They are thought to be much easier to maintain than iron pipes.

The slurry in the tanks is agitated by compressed air, discharged from pipes at the bottom of the tanks at a pressure of about 60 pounds. This agitation keeps the slurry at a constant mixture throughout the tank.

The slurry, when properly mixed, is taken from the bottom of the mixing tanks by one of a duplicate set of Wilfley feed pumps and pumped to the feed tanks for feeding the kilns.

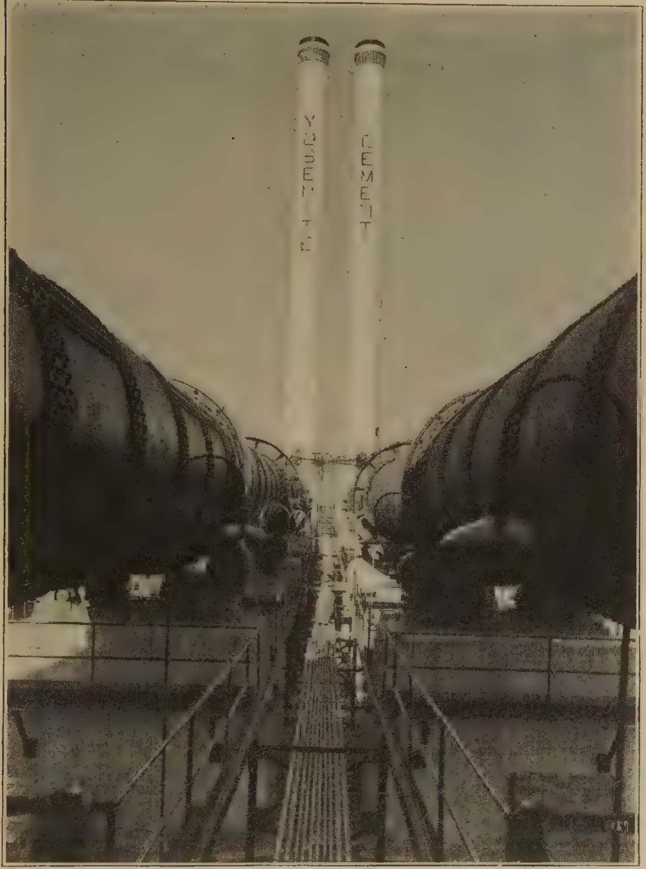
### Kilns

The kilns are on the opposite side of the rock storage from the raw mill. A concrete tunnel connects the two departments passing under the rock storage pile. This tunnel, besides being a passenger tunnel, serves as a gallery for the utility pipes and conduits.

As was stated, the slurry is pumped from the slurry mixing tanks to the kiln feed tanks. These kiln feed tanks are two concrete silos holding the equivalent of 700 barrels of cement. From the silos the slurry is pumped to an elevation of about 50 ft. and discharged into a kiln feed sump. From the sump it is taken by an Allis Chalmers ferris wheel type of feeder and fed to the kilns. This ferris wheel feeder is driven by a rope drive direct from the kiln drive and is thus kept running at a constant ratio to the speed of the kiln. The amount of materials delivered by the ferris wheel is regulated by the angle at which the twelve buckets are set. This angle can readily be changed at any time as required. The liquid slurry is fed into the cool end of the kiln and is later discharged from the hot end as red hot clinker.

There are two duplicate Allis Chalmers rotary kilns 240 ft. long by 10 ft. inside diameter, lined with 9 in. of fire brick. The kilns are carried on four tires. The tires are full floating and are not rigidly connected to the drum but are held against the drum by liners, so that in case of emergency the tire can slip on the drum, with a minimum of jolt, acting as a brake.

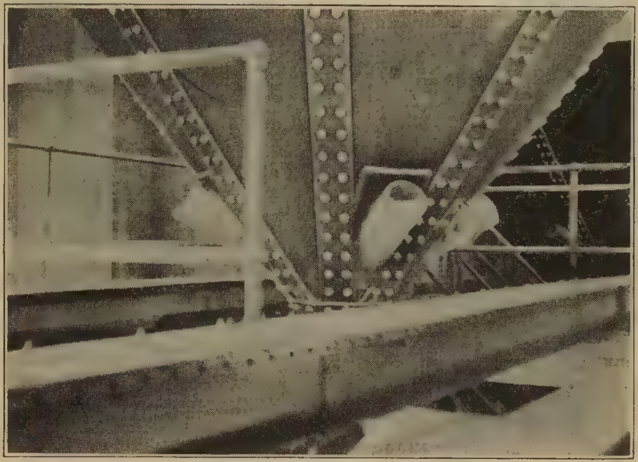
Each kiln is driven by a 75 h.p. Westinghouse variable speed motor having thirteen speeds. The reduction from the motor to the rotation of the kiln is 1500 to 1, the kiln rotating at a speed varying from 4½ minutes per revolution to 2 minutes per revolution. The motor is set on the ground level beneath the kiln and drives the mill through a belt drive. This gives an added flexibility of drive. The belt drives through a reduction gear train to the gears which drive the kiln.


*The kiln stacks are illuminated at night by spotlights. They can be seen for many miles*

## Crude Oil Fuel Used

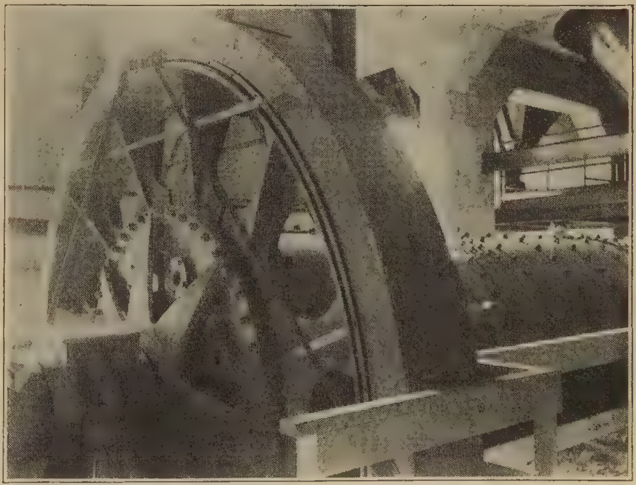
The firing end of the kiln is located in an inclosed building, and the kiln is fired by crude oil. The oil is heated before being fired, by steam from a Kewanee boiler located in the same building. A specially designed removable hood comprises the firing end of the kiln. It is made with a structural steel frame lined with fire brick and is carried on wheels running on a track. In case of repairs to the lining of the kiln this hood can be run back out of the way giving free access to the inside of the kiln. When closed up, hood gives a tight connection with the kiln.

Air at two pounds pressure is used for atomization. One oil burner is used for each kiln, with adjustments for changing the flame as desired. The kiln operator can regulate the heat of the kiln and its speed as required. The heat and draught through the kiln moves in the opposite direction to the flow of the slurry which gradually works toward the hot end of the kiln by gravity due to the slope of the kiln which is ⅝ in. to the foot. The draft through the kiln collects a certain amount of dust with the moisture from the slurry. This dust is collected in a long, depressed horizontal flue and is cleaned out occasionally and carried back to the raw rock storage. The moisture is drawn through the flue into two concrete chimneys 10 ft. in diameter and 200 ft. high fire brick lined half way, built by the Weber Chimney Company.


*Clinker bins, showing poke holes for dislodging clinker that binds in the bins*

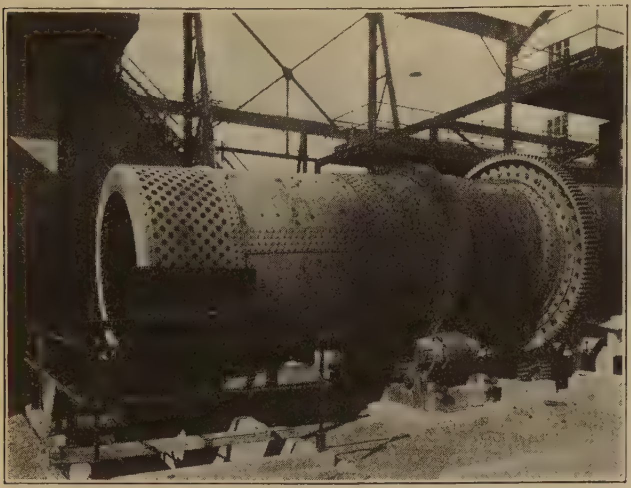
## Clinker Coolers

Under the discharge end of each kiln the receiving end of a rotary clinker cooler is located. This is similar in most respects to the rotary kiln but is 8 ft. inside diameter and 95 ft. long. Each cooler is driven by a 40 h.p. belt driven variable speed motor.


*The finish grinding mill*

The hot clinker from the kiln is discharged into the high end of the cooler and gradually works its way to the discharge end. A draft of air is drawn through the cooler in opposition to the direction of the flow of clinker. This air becomes heated as it reaches the receiving end of the cooler and is thus returned to the kiln, conserving the heat.

The clinker is discharged from both the coolers onto a belt conveyor which discharges to one of two duplicate bucket elevators, which carry the clinker to the finish mill feed hoppers or into clinker storage as desired.


*Discharge end of the cooler*

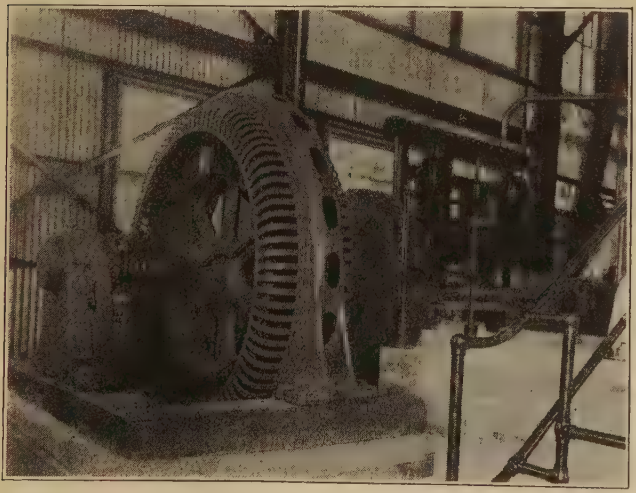
The feed end of the cooler is equipped with a removable hood similar to that of the kiln.

### Finish Mills

The finish mills are practically the same as the raw mills, being duplicate Allis Chalmers mills 7 ft. by 26 ft. with a 96,000 pound charge. They are driven by 500 h.p. synchronous motors, the same as the raw mills.

Gypsum is fed to the hoppers of the finish mills from two gypsum storage hoppers, which are equipped with revolving cylinder gates that can be made to deliver any predetermined amount of gypsum that may be required.

With the gypsum added, the finish mills are fed through rotating plate feeders and the material in passing through the mills is ground to a fineness so that at the discharge end 88 to 89 per cent will pass a standard sieve of 200 mesh. The finished cement is discharged through a screened screw conveyor into a drum from which it is pumped by a Fuller-Kinyon pump through a 600 ft. 4-in. pipe to the top of the storage silos.


*Synchronous motors for driving tube mills*

### Storage Silos and Packing House

As was stated, the finished cement is pumped from the finish mill to the top of the storage silos. There are four silos, each 32 ft. in diameter and 60 ft. high with one star bin and three interstice bins.

At the top of the silos there is a branch pipe from the 4-in. pipe to each of the bins. The cement is taken from the bins at the bottom, by spouts delivering into four screw conveyors. These screw conveyors deliver into a cross screw conveyor which in turn discharges into a bucket elevator, carrying the cement up into the packing machine feed hoppers. From these hoppers the cement goes to two Bates three-spout packing machines. Here the sacks are automatically filled and weighed and are then carried on a conveyor to the shipping platform.

These sacks are tied at the top and are filled through a valve at the bottom. A new Bates sack tying machine has just been installed which will replace the former hand operated tyers. This new machine is motor driven and can tie 2000 sacks per hour. The sacks are fed into the machine flat and are puckered and tied automatically. The wire for tying is fed from a spool.

### Machine Shops

A well equipped machine shop and blacksmith shop are maintained for all repairs and for light building work. There are two machine lathes, a bolt and pipe threading machine, one drill press with 4 ft. swing, one shaper with 15 in. stroke, one emery strand, a forge and a welding outfit.

### Oil Storage

An oil storage building is located on the railroad siding not far from the power house. Oil is delivered to this storage in tank cars, which delivers the oil by gravity into an underground concrete storage reservoir with a capacity of 80,000 barrels. The oil is pumped to the kiln house by a 3-in.Worthington triplex pump through a 3-in. line. Five tank cars can be unloaded at a time.

### Miscellaneous Features

Water for the plant operation is provided by pumping from two wells 170 ft. deep. These are equipped with Dean electric motor driven deep well pumps. Storage for water is provided in an elevated steel tank 95 feet high with a storage capacity of 50,000 gallons.

Power is purchased from the San Joaquin Light and Power Company from its 60,000 volt line. This is stepped down to 11,000 volts at the plant sub station. There is also an auxiliary 11,000 volt line from another source, so that in case of interruption to the main line the plant can immediately swing over to the auxiliary line.

The plant has been in successful operation for more than a year and has come down to the smooth running basis. The cement that is turned out is of exceptional quality and is growing in popularity. The output is now over 2800 barrels per day and there is a storage capacity in the silos for 54,000 barrels.

### Personnel

The offices of the Yosemite Portland Cement Corporation are: A. Emory Wishon, president; Murray Bourne, secretary-treasurer; and George A. Fisher, general manager. The principal offices of the corporation are at Merced. A sales office is maintained in the Standard Oil Building, San Francisco.

# MEN and MILLS

## *Notes from the Field*

### Green Is Pacific Coast Plant Manager

W. H. Green has been appointed works manager of the new Pacific Coast Cement Company's plant now nearing completion on East Waterway below Spokane Street, Seattle, Washington.

In announcing the selection of Mr. Green, N. D. Moore, vice-president, stated that the appointment had been made only after an extended search for a man who was thoroughly experienced with the latest methods in the manufacturing of all kinds of portland cements.

"Favored with such high quality limestone and the latest machinery money can buy," said Mr. Moore, "We felt that it was most important that the best man available be secured to direct the actual plant operations."

Mr. Green is a graduate of the University of Michigan in 1902 and has not only worked his way through all the positions in both wet and dry cement plants but has installed a large cement plant in India. During the past twenty-two years spent entirely in cement manufacturing, Mr. Green has been associated with cement plants at Iola, Kansas; Dallas, Texas; Montreal, Canada; Hudson, New York and Jubbulpore, India.

The new Pacific Coast Cement Company plant has been constructed at a cost of several million dollars under the supervision of Maj. S. E. Hutton, research engineer of the Pacific Coast Company. The project is the largest industry to locate in Seattle for several years.

### Chubb New Penn-Dixie Service Manager

J. H. Chubb has been appointed manager of the service bureau of the Pennsylvania-Dixie Cement Corporation, with headquarters in the New York City office.

Mr. Chubb, a graduate civil engineer, has had over twenty years' experience observing the results obtained with and advising concerning the proper use of portland cement and concrete. He is a member of the Western Society of Engineers, American Concrete Institute and American Society for Testing Materials. For many years he has been a member of the Committee on Technical Problems, Portland Cement Association.

Mr. Chubb is the author of a number of booklets covering the proper use of concrete.

### Charles McNider Dies; President of Northwestern States

Charles H. McNider, president of the Northwestern States Portland Cement Company, fell dead in his office at noon at Mason City, Iowa, on October 30. He had been talking to a doctor over the telephone.

In addition to being president of the Northwestern States, he was a director of the Federal Reserve Bank of Chicago and had other bank and real estate interests. Mr. McNider was known as one of Iowa's wealthiest and most prominent residents.

Col. Hanford MacNider, past national commander of the American Legion and former assistant secretary of war, was his son. Upon hearing of his father's death, he left Chicago immediately by airplane for Mason City.

Col. MacNider learned some years ago that the family name had been Madnider and he reverted to the original spelling. The elder McNider declined to do so.

### Universal Appoints New Managers in East

New appointments by the Universal Portland Cement Company have been announced by F. L. Stone, general sales manager of the company, as follows: R. H. Hoy, former division sales managers, sales manager, Pittsburgh; N. A. Kelly, former division sales manager, sales manager, New York; J. K. Hallock, former division sales manager, assistant sales manager, Pittsburgh; F. A. Brine, division sales manager, Pittsburgh, succeeding R. H. Hoy; W. H. McDowell, former sales agent, Cleveland, division sales manager, Pittsburgh.

### Sandusky Plant Builder Tells Kiwanians of Features

Members of the Dixon, Ill., Kiwanis club learned recently of some of the important features of the local plant of the Sandusky Cement Company from a talk given by Edwin W. Carlson, in charge of the reconstruction of the plant.

In his talk, Mr. Carlson stated that the company now owns 280 acres of land and that but 60 of them have been quarried.

Also, that among the improvements under way, are six silo type storage tanks with a capacity of 375,000 barrels and a storehouse of 200,000 barrels.

Mr. Carlson also pointed out that the Dixon mills were the first in the country in which waste heat was used for power to operate the entire mills.

### Monolith Shipment to Alaska

Monolith portland cement recently made up what, while not an unusual shipment in size, was nevertheless an interesting one. A Seattle, Washington, dealer a month ago filled an order for 100 sacks of Plastic waterproof portland cement to the Aleutian Livestock Company at Dutch Harbor, Alaska, where it will be used for dampproofing kennels for silver foxes and building water troughs for reindeer.

This is also the farthermost point north that the Monolith product has been shipped.

### Lehigh Men Visit Western Plant

Daniel E. Ritter, vice-president and general manager, and H. R. Hausmann, traveling auditor, of the Lehigh Portland Cement Company recently visited the Metaline Falls plant of the company, in the state of Washington.

### Southwestern Advertising

The Southwestern Portland Cement Com- with plants at Victorville, Calif., and El Paso, Tex., has appointed the Houston Advertising Service Company of Los Angeles to direct the advertising for Victor Hydro-Plastic cement.

### Employe's Minor Injury Loses Safety Flag for Newaygo

With real regret the Newaygo Portland Cement Company plant at Newaygo, Mich., was forced to lower its safety flag on October 10th and step out of the race for a perfect record during the year.

One of the plant employes suffered a minor injury to the hand recently. It was the first "lost-time" accident in the plant since the flag was raised 118 days ago.

## Idaho Company Officials Invite Local Capital

J. Tom O'Brien, first vice-president of the Idaho Portland Cement Company, recently visited Pocatello, Idaho, to inspect the site of the plant the company is erecting near Pocatello, at Inkom. Accompanying him were J. H. Neill, second vice-president; J. B. Maxfield, secretary-treasurer, and J. F. Brod, construction engineer.

Mr. O'Brien was the principal speaker at a meeting of the chamber of commerce and he in turn introduced his co-workers.

E. J. Simmons, president of the company, was host to a number of business and professional men of the town at a dinner September 25th. On this occasion the conception of the project was described and its future outlined.

## Penn-Dixie's Representative in Georgia Bursts Into Print

From "Penn-Dixie Doings," the house organ of the Pennsylvania-Dixie Cement Corporation—

"The following is a reprint from the "Columbus Inquirer Sun," and refers to our own Joe Varela, special representative in the state of Georgia:

"'Mr. J. E. Varela, cement chieftain, with headquarters in Atlanta, came to town on Labor Day. We have often thought that if the cement business ever got dull Mr. Valera could enter the movies, taking a part suited for his romantic cast of features.'"

## Chelsea Superintendent Injured While Driving

M. H. McGaffigan, superintendent of the Michigan state cement plant at Chelsea, was severely injured about the head when he was pinned beneath his automobile as it overturned after skidding on loose gravel on October 8th.

Mr. McGaffigan was on his way from Chelsea to attend a good roads meeting.

## Cement Executive Submits to Operation

Charles Boettcher, the 76-year-old president of the Ideal Cement Company, Denver, underwent a serious operation November 5th and is rallying nicely.

## Van Zandt Leaves Denver

Paul R. Van Zandt of the Ideal Cement Company has moved from Denver to Saratoga, Arkansas, to work on the plant of the Arkansas Portland Cement Company.

## Southwestern Accountant

J. W. Hearron of Osborne, Ohio, an auditor of the Southwestern Portland Cement Co., has been appointed director of meetings by the National Association of Cost Accountants.

## Engineers Club Visits Plant of Pacific Coast Cement Company

Machinery of one of Seattle's newest industries was set in motion November 1st as 142 members of the Engineers Club viewed the unloading of crushed limerock from the holds of the S. S. Eastern Coast, first of the two liners of the revived Pacific Coast Steamship Co. to arrive at the site on the East Waterway and Charleston street of the Pacific Coast Cement Company plant.

The making of Diamond cement will not begin for another 30 days but accumulation of a supply of raw material from Dall island, Alaska, 675 miles north of Seattle, is in preparation of the full operation of the $3,000,000 plant.

The engineers were guests of the company at luncheon in the laboratory of the company on the cement plant site. Following luncheon they were conducted throughout the plant by officials of the company.

Unloading of the limerock is by means of a 13-ton hammer head crane designed to operate throughout the length of the 460-foot wharf. The crane operates a four-yard bucket from a 100-foot boom and works at the rate of 200 tons an hour. The limerock is crushed to one inch and under. The Eastern Coast carried 6600 tons. A sister ship will alternate on the run, having like capacity. A round trip will be completed in ten days.

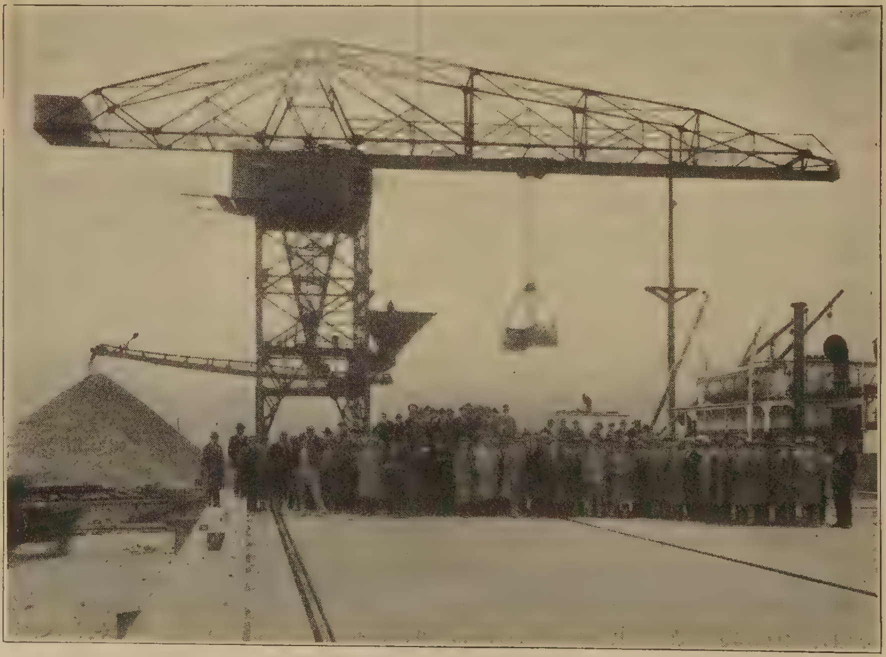
Operation of the cement plant will add 200 men and approximately $200,000 annually to the payroll of the Pacific Coast Company subsidiaries in this territory. The total pay roll of all operations connected with the production of cement will aggregate $350,000 annually.

The output of finished product will amount to 3000 barrels daily. The plant will require about 2200 cars of coal yearly and 120 cars of gypsum. The annual output will amount to 4000 cars of finished cement.

There will be kept in storage at the plant at all times limerock in pile to an amount equal to 100,000 barrels of cement, 150,000 barrels of cement in the form of clinker, and 100,000 barrels of finished cement.

In addition to the limerock needs of the cement plant there will be brought to Seattle a quantity sufficient to provide for additional industries which are now negotiating with the Pacific Coast Cement Co. for the product. Industries now considering locating in Seattle on tidewater in order to get limerock necessary to the manufacture of other products than cement include one connected with the production of carbide, it was stated.

Major S. E. Hutton of the Pacific Coast Company, engineer in charge and designer of the cement plant, will now turn his attention to development of other industries looking to utilization of the coal being produced by the Pacific Coast Coal Co.



Rail lines are laid to connect with the Pacific Coast Railroad which hauls coal from the mines of the Pacific Coast Coal company 30 miles from Seattle.

Diamond cement will be offered publicly the latter part of January, it being necessary to test the product for about 30 days following manufacture, it was explained by Assistant Sales Manager Darwin Meisnest.

N. D. Moore, vice-president of the Pacific Coast Cement Co. and Wylie Hemphill, vice-president and sales manager of the company, together with Mr. Meisnest conducted the engineers on a tour of inspection of the plant.

# *Cement Statistics for October*

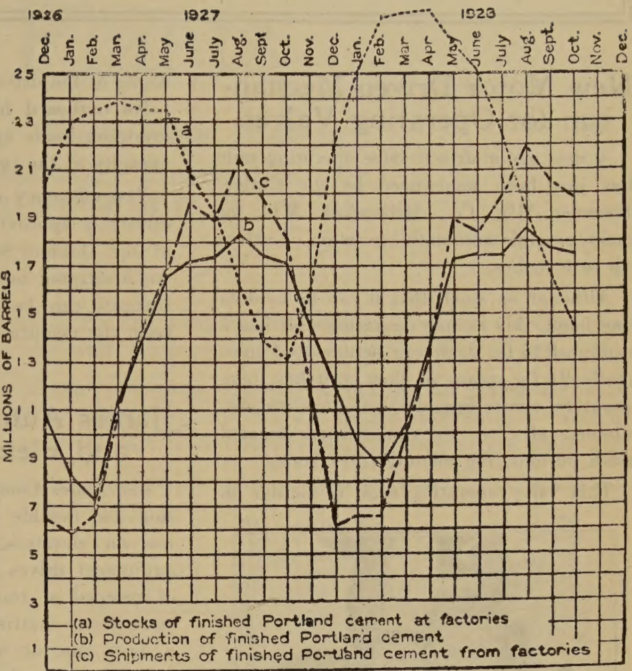
### *Shipments 9.6 Per Cent Above October, 1927—Total Production for First Ten Months of the Year 3,000,000 Barrels Greater Than for Same Period Last Year —Plants Operate at 87.1 Per Cent of Capacity*

NOTE: ALL OCTOBER STATISTICS, INCLUDING TOTAL PRODUCTION FOR THE YEAR AND TOTAL SHIPMENTS FOR THE YEAR UP TO AND INCLUDING OCTOBER ARE SHOWN IN HEAVY ITALIC TYPE.

| | 1927 | *1928* | Increase |
|---|---|---|---|
| Production | 17,174,000 | ***17,533,000*** | 2.1 |
| Shipments | 18,105,000 | ***19,836,000*** | 9.6 |
| Stocks at end of month | 13,141,000 | ***14,495,000*** | 10.3 |
| Total production for year to date | 145,460,000 | ***148,569,000*** | 2.1 |
| Total shipments for year to date | 153,103,000 | ***156,120,000*** | 1.9 |
| No. of plants reporting | 154 | ***159*** | |

### *Relation of Production to Capacity*

| | —October— 1928 | —October— 1927 | Sept. 1928 | Aug. 1928 | July 1928 |
|---|---|---|---|---|---|
| | per cent | per cent | per cent | per cent | per cent |
| The month | ***87.1*** | 87.4 | 91.7 | 93.1 | 87.0 |
| The 12 months ended | ***73.8*** | 73.6 | 73.7 | 73.5 | 73.7 |



### *Production, Shipments and Stocks of Finished Portland Cement, by Districts, 1927 and 1928, and Stocks in September, 1928*

| District | Production 1927—October | Production October—1928 | Shipments 1927—October | Shipments October—1928 | Stocks at end of month 1927—October | Stocks at end of month October—1928 | Stocks at end of September 1928* |
|---|---|---|---|---|---|---|---|
| Eastern Pa., N. J. & Md. | 3,799,000 | ***3,743,000*** | 3,924,000 | ***4,753,000*** | 3,389,000 | ***3,976,000*** | 4,987,000 |
| New York and Maine† | 1,143,000 | ***1,204,000*** | 1,171,000 | ***1,375,000*** | 1,142,000 | ***1,102,000*** | 1,273,000 |
| Ohio, Western Pa., & W. Va. | 1,746,000 | ***2,120,000*** | 1,964,000 | ***2,294,000*** | 1,513,000 | ***1,985,000*** | 2,159,000 |
| Michigan | 1,557,000 | ***1,550,000*** | 1,560,000 | ***1,673,000*** | 1,077,000 | ***757,000*** | 879,000 |
| Wis., Ill., Ind. & Ky. | 2,280,000 | ***2,238,000*** | 2,579,000 | ***2,646,000*** | 885,000 | ***876,000*** | 1,283,000 |
| Va., Tenn., Ala., Ga., Fla., & La. | 1,567,000 | ***1,561,000*** | 1,505,000 | ***1,576,000*** | 1,178,000 | ***1,619,000*** | 1,634,000 |
| Eastern Mo., Ia., Minn., & S. Dak. | 1,572,000 | ***1,599,000*** | 1,811,000 | ***1,705,000*** | 991,000 | ***1,466,000*** | 1,572,000 |
| Western Mo., Nebr., Kans. & Okla. | 1,109,000 | ***1,190,000*** | 1,208,000 | ***1,361,000*** | 1,213,000 | ***992,000*** | 1,164,000 |
| Texas | 532,000 | ***617,000*** | 535,000 | ***552,000*** | 270,000 | ***346,000*** | 281,000 |
| Colo., Mont., & Utah | 187,000 | ***199,000*** | 258,000 | ***282,000*** | 313,000 | ***304,000*** | 387,000 |
| California | 1,388,000 | ***1,177,000*** | 1,268,000 | ***1,257,000*** | 824,000 | ***687,000*** | 768,000 |
| Oreg. & Wash. | 294,000 | ***335,000*** | 322,000 | ***362,000*** | 346,000 | ***385,000*** | 412,000 |
| | 17,174,000 | ***17,533,000*** | 18,105,000 | ***19,836,000*** | 13,141,000 | ***14,495,000*** | 16,799,000 |

### *Production, Shipments and Stocks of Finished Portland Cement, by Months, in 1927 and 1928*

| Month | 1927—Production | Production—1928 | 1927—Shipments | Shipments—1928 | Stocks at end of month 1927 | Stocks at end of month 1928 |
|---|---|---|---|---|---|---|
| January | 8,258,000 | 9,768,000 | 5,968,000 | 6,541,000 | 22,914,000 | 25,116,000 |
| February | 7,377,000 | 8,797,000 | 6,731,000 | 6,563,000 | 23,563,000 | 27,349,000 |
| March | 11,450,000 | 10,223,000 | 11,100,000 | 10,135,000 | 23,922,000 | 27,445,000 |
| April | 14,048,000 | 13,468,000 | 14,350,000 | 13,307,000 | 23,654,000 | 27,627,000 |
| May | 16,701,000 | 17,280,000 | 16,865,000 | 18,986,000 | 23,503,000 | 25,984,000 |
| June | 17,224,000 | 17,469,000 | 19,761,000 | 18,421,000 | 20,972,000 | 25,029,000 |
| July | 17,408,000 | 17,445,000 | 18,984,000 | 19,901,000 | 19,397,000 | 22,580,000 |
| August | 18,315,000 | 18,730,000 | 21,411,000 | 21,970,000 | 16,292,000 | *19,374,000 |
| September | 17,505,000 | 17,856,000 | 19,828,000 | *20,460,000 | 13,996,000 | *16,799,000 |
| October | 17,174,000 | ***17,533,000*** | 18,105,000 | ***19,836,000*** | 13,141,000 | ***14,495,000*** |
| November | 14,449,000 | | 11,619,000 | | 16,022,000 | |
| December | 11,999,000 | | 6,200,000 | | 22,082,000 | |
| | 171,908,000 | | 170,922,000 | | | |

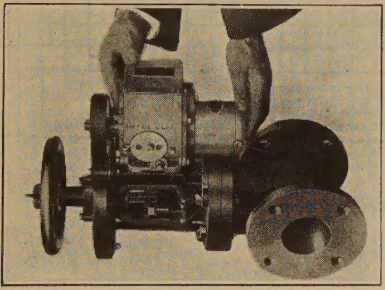
# Mill Equipment

## New Motor Driven Mechanism for Operating Valves

A new motor driven valve operating unit has just been announced by the Cutler-Hammer Mfg. Co., Milwaukee, Wis., to make possible automatic operation of valves up to 6 inches.

Although so small that it can be held in one hand, this unique operating unit has a rating of 15 lb. ft. It can be operated automatically by means of float switches, temperature controlling devices, pressure regulators, etc., or by conveniently located push buttons, the manufacturer states.

This valve operating unit is similar in principle to the standard C-H "Dean" operating unit.



Literature describing this new unit (called C-H type Ao Valve Operating Unit) will be sent upon request to the Cutler-Hammer Mfg. Co., Milwaukee, Wis.

## New Palmer-Bee Herringbone Speed Reducers

The Palmer-Bee Company, Detroit, has just placed on the market a new line of herringbone speed reducers.

The following is a description of the equipment as furnished by the manufacturer:

Anti-friction bearings are used throughout; ball bearings on the high speed, Hyatts on the intermediate and Timkens on the slow speed shaft. Gears are continuous-tooth herringbone, with silent Kysor tooth form, producing added rolling and reduced sliding action. Slow speed gears in the double and triple series are divided in the center, permitting a more symmetrical arrangement of the gearing and a uniform load on each bearing.

Following the universal practice of the automotive industry in using the three-point method of mounting motors in chassis, the Palmer-Bee Company has adopted this method in bolting the reducer to the sub-base. Alignment of the various elements of the drive are thus facilitated.

No outboard bearings are required for overhung loads up to the maximum rated capacity of the reducer.

The efficiency of the Single Series Reducers is approximately 99 per cent, and of the Double Series about 97 per cent. An illustrated folder describing the salient features can be obtained for the asking from the manufacturers.

## James Automatic Backstop and Flexible Coupling

The James Combination automatic backstop and flexible coupling is designed for use on elevators, conveyors and process equipment drives where there is a chance of reversal of travel following idleness of equipment, shutting off of the motor after a day's run, or in case of motor failure. Large capacity bucket elevators and conveyors are said to be easily held in position without fear of their backing up by using the backstop.

The manufacturers give as an instance of an ideal application one where the unit acts as a brake against heavy loads on all driven machinery where there is always great danger from loads running backward and causing damage.

The D. O. James Manufacturing Company, Chicago, manufactures the backstop.

## Weller Capstan Car Pullers in Two New Sizes

The Weller Mfg. Co. has recently designed two sizes of the upright capstan type, electrically operated, car puller.

The new type is a compact, self-contained unit, occupying very little space. It will pull in any direction or at any angle, the manufacturers state. It operates at the touch of a button, they continue. The consumption of power and expense of operating are said to be very little.

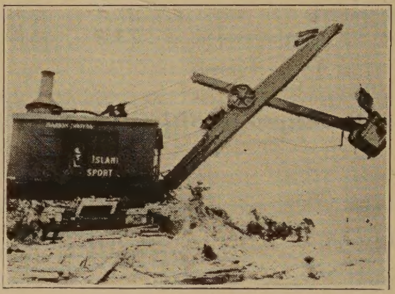
The C-1 will develop full strength of 1¼ in. manila rope and will pull from one to three cars, the larger size developing full strength of 1½-in. manila rope and will pull from three to six cars, it is claimed.

A car puller installed does away with waiting for the switch engine and crew, also saves the time of the regular force, who are usually compelled to stop their work and move the cars with pinch bars, it is pointed out.

It is also adapted for other purposes such as moving cars in and out of kilns, moving heavy trucks, and pulling materials around the yard or plant.

## Three Additions Made to the Marion Line

The Marion Steam Shovel Company announces the introduction of a new group of 2 cu. yd. shovels, the Type 480. These machines are of the same general construction and capacity. They have uniform underframe and crawler construction, uniform boom, handle and dipper dimensions. Their crane, clamshell and dragline equipments are uniform. They are, however, built with three types of primary power supply. The one following the longest line of historic precedent is the steam powered 480. Another is the electric 480, the last, and latest—the carefully engineered and fully tested Diesel-Electric 480.



With 25-ft. railroad shovel type boom—combination wood and steel; with 17-ft. inside dipper handle—also wood and steel, and 2 cu. yd. dippers, they follow closely the designs of the Marion Type 37. The new 480, however, is heavier, more rugged, more powerful, with better balance and having better appearance.

On the electrics the manufacturer states that improvement has been made in the electrical equipment.

The Diesel-Electric is a new development. A Winton Diesel engine direct connected to a direct current "drooping voltage" generator supplies the power for the electric motors which are geared individually to hoist, swing and crowd. From generator to dipper, the Diesel Electric is a duplicate of the electric and incorporated therein are all the advantage-giving features noted in connection with the electric. The Diesel engine horsepower is 150 at 750 r.p.m. The generator is 50 kw. and the hoist motor is 90-horsepower 60-min. rating, while swing and crowd motors are 30 horsepower. For short periods and in typical shovel service the generator and motors will deliver several times their ratings.

# Waste Heat Boilers Applied to Cement Plants

### *The Increasing Number of Waste Heat Boilers Installed in the Cement Industry Shows the Trend Toward This Method of Heat Recovery*

The use of waste heat boilers in cement mills has increased steadily during the past decade. There were four installations in 1915 and over sixty in 1926. The load factor in cement plants is very high,—consequently, the capital invested in the power plant is put to its maximum use and the net cost of power developed is at a minimum.

In the older plants, the temperature of the gases leaving the cement kilns was from 1100 to 1500 degrees Fahr. and the heat recovered in the waste heat boilers was sufficient to generate practically all the steam necessary for operation of the plant.

However, in new installations made during the past several years, there has been a trend toward the wet process and the use of kilns considerably longer than those of earlier designs. As a result, the capacity of the kilns has been increased, and the exit gas temperatures have been reduced below the point where waste heat boilers are justified. It then becomes necessary to install a separate, direct fired boiler plant or to purchase power. This item of power cost is an important factor in comparing the two methods of producing cement.

In cement plants already in operation, there is no difficulty in justifying the installation of waste heat boilers. That waste heat recovery is economical is evidenced by the fact that the number of plants using this method of securing power is increasing steadily.

A typical waste heat boiler installation consists of a sealing ring on the kiln flue for connecting the kiln to the boiler, a dust settling chamber, superheater, boiler, economizer, fan and stack. On some of the latest installations means are provided for returning the fine dust to the kiln, thus preventing its being discharged from the stack.

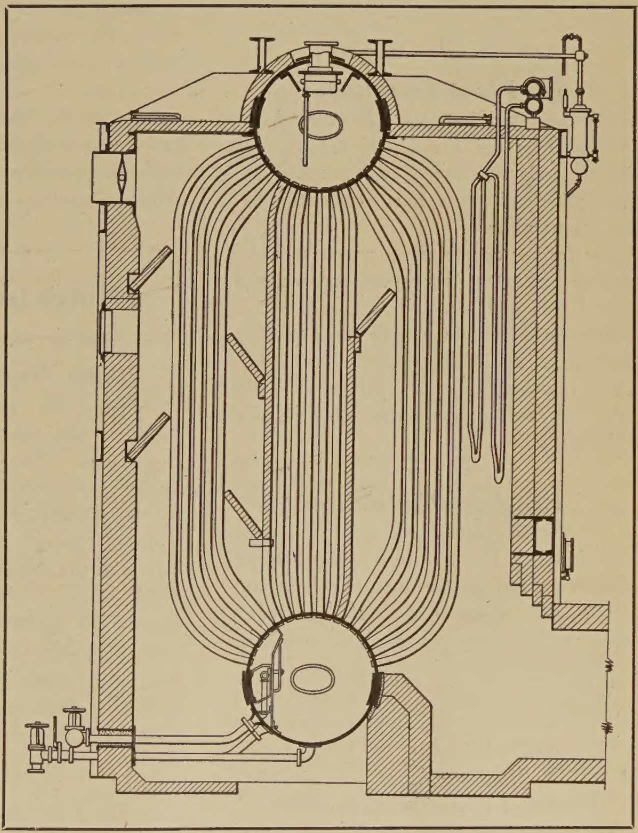
Boilers may be installed on individual kilns or connected to a common flue serving several kilns. Both methods are in successful operation.

A great deal has been written about the available water power of the country and the great amount of energy that is going to waste and can never be recovered because of water flowing down our streams without doing useful work.

Hydro-electric plants must usually be located at a considerable distance from the market and require expensive transmission lines as well as standby steam plants to provide for low water conditions and transmission line interruption

The heat that goes up the stack is likewise lost forever—and, a waste heat boiler installation has the advantage of being at the market. Further—when the furnace producing the heat is shut down, there is no need for power and, consequently, no standby plant is required.

These conditions are not limited to the Cement Industry for waste heat boilers are being successfully used in recovering the heat from copper furnaces, oil stills and in fact, from all industrial applications requiring heat in the treatment of material.



*Ladd Two-drum Boiler for Waste Heat Application*

The use of waste heat boilers has other advantages than the simple recovery of waste heat.

With mechanical draft, more uniform furnace conditions can be maintained. This close control of operating conditions results in improved quality of the product and increased output of the furnace.

Upon request, an interesting folder describing Waste Heat Boiler practice will be sent by the Ladd Water Tube Boiler Company, 200 Madison Avenue, New York.

# With the Manufacturers

## Industrial Literature

### *Descriptive of Jaw Crusher*

A new bulletin has just been received from the *Traylor Engineering and Manufacturing Company* known as No. 2099 and replacing No. 1099. It concerns the bulldog jaw crusher and is 24 pages in length.

Particular attention is called to the safety device installed on the crusher. This, it is stated, protects all parts of the machine from injury in the event that the pitman rods are subjected to a dangerous overload by reason of tramp iron being introduced with the feed or the packing of the discharge opening with damp or sticky material.

### *On Plant Equipment*

Two new publications *Bulletins 11* and *14*, issued by the *Kennedy-Van Saun Mfg. and Eng. Corporation*, New York City, are descriptive of numerous cement plant equipment units.

The former covers gyratory crushers, jaw crushers, elevators, conveyors, screens, grizzlies, hoists and so forth.

*Bulletin 14* catalogs such equipment as crushers, heavy duty rolls, dryers, rotary kilns, tube mill system, rotary cooler, ball, tube and combination mills, and the Kennedy rod mill.

### *Crusher Publication*

*The New Holland Machine Company*, New Holland, Pa., has just issued a Bulletin 100, of four pages, covering New Holland rock crushers. The publication covers the features of construction and operation, general specifications and diagrams.

Similar publications on various other types of equipment will follow. The bulletin is punched for loose-leaf binding.

### *Water Feeder Publication*

The new Copes Type SS differential water pressure regulating valve for boilers is the subject of a four-page folder published by the *Northern Equipment Company*, Erie, Pa. A detailed description of its construction, operation and results, diagrams, and test results comprise the bulk of the material of this publication.

### *Small Belt Drive Handbook*

*A Handbook of Small Belt Drives*, issued by the *L. H. Gilmer Company*, Tacony, Philadelphia, Pa., discusses the use of belts of rubber and cord fabric for power transmission, with special reference to the application of V-belts to short center and high speed drives. Engineering data are given for use in designing V-belt drives, and numerous illustrations show belts on a wide variety of machines.

The manner in which Gilmer belts are built up with the cords along the neutral axis of the belt, where internal friction is at a minimum, is shown by a cross-section of the belt which forms a feature of the cover design.

### *Sirocco Heater Catalog*

The *"Sirocco Unit Heater Catalog No. 7418"* has just been published by the *American Blower Corporation*, Detroit, Mich. The product described is new and its manufacturers claim it the ideal heating unit. The heaters are made for floor or ceiling applications, in high or low pressure types.

The catalog shows and describes installations, parts comprising the unit, the automatic temperature control, etc. Dimension diagrams and specifications follow.

## Notes from the Field

### *Paper Bag Manufacturers*

Demand for paper bags and related products has warranted the formation of the *Taggart Corporation* in the East, to acquire the preferred and common stocks of the *Taggart Bros. Company, Inc.*, the *Taggart Oswego Paper and Bag Corporation*, and the *Champion Paper Corporation.* Wall Street co-operation was secured to finance the project.

Upon completion of a new bag factory now under construction at Carthage, New York, the capacity of the plants under this ownership will be 200,000,000 bags annually.

### *De La Vergne New York Office*

Although its plant and general offices have moved from New York to Philadelphia, the *De La Vergne Machine Co.* announces that it still maintains a large staff at its New York branch offices at 100 Broadway, New York City.

### *Kennedy-Van Saun in Chicago*

The *Kennedy-Van Saun Company of Illinois* has been formed at Chicago and is located in the State Bank Building, 120 South La Salle Street. T. J. Shearer is the manager in charge.

### *Huron Industries Move*

*Huron Industries, Incorporated*, manufacturers of speed reducers, seal rings and flexible couplings, have moved the general sales office from Alpena, Mich., to the Builders Building, Chicago, Ill., effective November 1st.

H. W. Munday has been appointed general sales manager with offices in Chicago. Mr. Munday was formerly editor-in-chief of "Pit and Quarry," "Pit and Quarry Handbook" and the "Fertilizer Green Book," where for the past five years he has been closely identified with many problems of the mining and process industries. He is a graduate engineer of Armour Institute of Technology and Purdue University.

### *Timken Exhibit*

*The Timken Roller Bearing Company*, of Canton, Ohio, will occupy spaces No. 232 and No. 233 at the New York Power Show at the Grand Central Palace in December. One of the features of the company's exhibit will be a mechanical display portraying the widespread use of bearings in all sorts of industrial and automotive equipment. There will also be a bearing of the type used on steel mill roll necks, and a complete railway bearing and mounting. The latter is cut away to show the mounting of the bearing. The rest of the exhibit will consist of an assortment of bearings of types suitable for different applications.

*S. C. Merrill* of the company's New York office will be in charge of the exhibit.

### *New Cutler-Hammer Engineer*

Appointment of *N. L. Mortensen* as chief engineer for *The Cutler-Hammer Mfg. Co.*, Milwaukee, has been announced, effective September 1st.

*T. E. Barnum*, former chief engineer, has been appointed consulting engineer for the company, in which position he will be able to give uninterrupted attention to engineering problems and outside engineering relations.

Mr. Mortensen has been connected with Cutler-Hammer for 21 years, the last 5 of which have been as assistant to Mr. Barnum. Born in Denmark and receiving his technical education there, and in Germany, Mr. Mortensen's versatility as a control engineer has long been recognized by United States industry. Articles by him have appeared frequently in the technical press and he has delivered numerous papers before electrical societies. He is a fellow of the A.I.E.E. and a member of the A.I.S.E.E.